THE
# METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

Vol. 26 NEW YORK, MARCH, 1928 No. 3

# Annual Meeting of the Institute of Metals Division

## A Report of the Sessions Held in New York, February 21-24, 1928

The Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers held its winter meeting February 21-24, 1928, at the Engineering Societies Building, 29 West 39th Street, New York. The program was large and varied, comprising sessions on lead, metallography, secondary metals, light alloys, copper and precious metals. The annual lecture was given by Dr. C. H. Mathewson of Yale University.

### NEW OFFICERS

New officers were elected as follows:
Chairman: S. Skowronski.
Vice-chairman: Dr. Zay Jeffries.
Secretary-treasurer: W. M. Corse.
Executive Committee: Dr. P. D. Merica, F. L. Wolf, S. Tour.

Mr. Tour is the new chairman of the Papers Committee. Other members of the Executive Committee who were re-elected are the following:

John R. Freeman, chairman of the Committee on Local Sections.

R. S. Archer, chairman of the Committee on Data Sheets.

Dr. E. C. Bain, chairman of the Committee on Publications in Mining and Metallurgy.

H. C. Jennison, chairman of the Membership Committee.

L. W. Spring, member-at-large.

Secretary Corse reported that the membership of the Division had grown from 861 to 1,004; the financial condition of the Institute was good and its importance and prestige were steadily growing.

### 1928 MEETING

The next meeting of the Institute of Metals Division will be held during the week of October 8th, 1928, at the Benjamin Franklin Hotel in Philadelphia, Pa. This meeting will be held together with the American Society for Steel Treating, like the meeting in the fall of 1927.

William H. Bassett spoke to the members and guests of the Institute at their annual banquet on February 22, describing the advances made in new alloys of copper. He laid particular stress on the developments in silicon alloys, mentioning Everdur (Cu 94.5, Si 4.5, Mm 1) and the Corson alloys (Ni 3, Co 2, Cr .5, or Fe 1; Si .70 or Be .25; Cu balance). High nickel alloys were also described, the most recent being Ambrac (Cu 74.5, Zn 5, Ni 20, Mn .50) and Adnic (Cu 70, Ni 29, Sn 1).

S. SKOWRONSKI
Chairman, Institute of Metals Division

Mr. Bassett also gave statistics showing the extraordinary growth in the consumption of copper both in old industries and in new fields.

Mr. Bassett was publicly congratulated upon his election to his post of vice-president of the American Institute of Mining and Metallurgical Engineers. The Institute of Metals Division now has two of its members on the Board of Directors of the A. I. M. E., William H. Bassett and David Levinger.

A report of the technical sessions is given below.

### A STUDY OF CERTAIN ALLOYS OF THE LEAD-TIN-CADMIUM SYSTEM WITH REFERENCE TO THEIR USE AS SOLDERS

By CARL E. SWARTZ

The properties of a number of alloys of the lead-tin-cadmium system were studied with reference to the suitability of these alloys for use of solders. The tensile strength of joints made between various metals with these solders were determined in comparison with similar joints made with ordinary lead-tin solders.

The tests showed that solders containing cadmium would make joints equal in strength to joints made with lead-tin solders and that the cadmium alloys were suitable in other respects for use as solders. Similar tests made with the same alloys to which 1.5 to 2.0 per cent. Zinc had been added showed that the addition of zinc in this proportion improved the properties of the alloys for this use.

In general, the investigation indicated the solders having compositions in the neighborhood of the ternary lead-tin-cadmium eutectic as being the best of the ternary alloys for most soldering work, though compositions varying rather widely from this may be more desirable for certain purposes.

As regards the introduction of cadmium solders into large-scale commercial soldering work, it was decided that the best place to make a start was in the operations in which properties peculiar to cadmium solders, such as low solidification temperature, give them a special advantage over lead-tin solders. Efforts in this direction are bearing fruit.

A very considerable and dependable market for cadmium solders already exists.

### TERNARY SYSTEMS OF LEAD-ANTIMONY AND A THIRD CONSTITUENT

By R. A. Morgen, L. G. Swenson, F. C. Nix and E. H. Roberts

1. The mutual solid solubility of tin and antimony in lead has been determined.

2. Small amounts of tin have little effect on the solid solubility of antimony at elevated temperatures, but tend to hold the antimony in solution at lower temperatures.

3. Small amounts of antimony have little effect on the solid solubility of tin.

4. Larger amounts of antimony decrease the solubility of tin rapidly.

5. Ternary lead-antimony-tin alloys show less dispersion hardening than binary lead-antimony alloys.

2. The first heating of a new furnace should be carried out under high hydrogen pressure, which may be later reduced.

3. If the material used for heating tubing or insulation contains carbon, oxides of a high degree of oxidation should be added, so that they may react with it, the products of the reaction to be removed by evacuation.

4. The molybdenum ribbon may be coated with molybdenum oxides having a low degree of oxidation to protect it from forming oxides or carbides.

### TWINNING IN BERYLLIUM, MAGNESIUM, ZINC AND CADMIUM

By C. H. Mathewson and A. J. Phillips

Twinning has often been observed in zinc and cadmium and was described and illustrated in two papers presented before the Institute of Metals Division during 1927. Axial ratios of beryllium, magnesium and cadmium have been reported but the twinning law for these metals had not been determined. As large single crystals cannot be developed in these metals by the method of straining and annealing, as is the case with zinc, as large crystals as can be obtained in the cast form by slow cooling were used. The data of the observations are given in tabular form and illustrated by stereographic

DR. ZAY JEFFRIES
Vice-Chairman
Institute of Metals Division

W. M. CORSE
Secretary-Treasurer
Institute of Metals Division

W. H. BASSETT
Vice President and Director, American Institute of Mining and Metallurgical Engineers

6. Tin is deleterious to the dispersion hardening of lead-antimony alloys.

7. At temperatures close to the solidus surface, there is a large increase in the solubility of tin.

8. The presence of tin in lead-antimony alloys appreciably lowers the temperature at which heat treatment may be performed.

### BEHAVIOR OF MOLYBDENUM AS RESISTOR IN THE ELECTRIC FURNACE

By Henry J. Miller and Marcella Lindeman

The destruction of molybdenum ribbons used as resistors in electric furnaces is due chiefly to chemical reaction with materials present in heating tubing, insula- various authors are doubtless due to the different treattion, or gases in the furnace. Of those materials most likely to be there, silica and carbon are the most destructive. For the best working conditions of such furnaces it is recommended that:

1. Both heating tubing and insulation should be of calcined pure alumina, mixed with aluminum hydroxide as binder and fired at 1500° C.

projections. It may be objected that the procedure adopted in all of these experiments identifies only the plane of composition between a twin lamella and the parent crystal without regard to the location of an axis of twinning.

The authors urge that the twinning law, which has been precisely determined in the case of zinc, in all probability holds for the remaining metals of the group, since they exhibit a marked analogy of crystal structure and develop twin lamellae of similar appearance along composition planes of the same form.

### SOME PECULIAR RESULTS IN HARDNESS TESTS OF LEAD-ANTIMONY ALLOYS

By L. O. Howard

1. Hardness tests made at the University of Idaho on a series of chill-cast antimony-lead alloys show a decided drop in hardness of alloys in the vicinity of 50 per cent antimony; a similar drop appears at 40 per cent antimony in a similar series tested at the South Dakota School of Mines.

2. Discrepancies in hardness numbers reported by

various authors are doubtless due to the different treatment given, as indicated by curves showing the difference in hardness of quenched and aged specimens (from results of Dean).

3. The possibility of a soft compound of lead and antimony in the vicinity of 50 per cent. antimony, forming after solidification, must be considered and might be revealed by more careful work. Roberts-Austen's statement that there is a soft compound of copper and antimony may be indicative of a similar compound of lead and antimony.

DISCUSSION

It was the concensus of opinion at the meeting that lead-antimony alloys containing high percentages of antimony do not expand upon cooling, contrary to an opinion that seems to be rather widely held. In some cases these alloys contract less than the molds in which they are cast. This results in sharp lines such as are found in type metal cast in the linotype machines.

## INTERATOMIC FORCES IN METALS AND ALLOYS

By Robert F. Mehl

The importance of the study of interatomic forces in metals and alloys is pointed out. It is shown that data on compressibility and internal pressure furnish a basis for the analysis of the hardness of the pure metals. It is suggested that the electron distribution around the atom periphery probably introduces a slip-resistance factor in addition to that of the crystalline symmetry and the interatomic forces.

The chemical attraction between unlike atoms in certain solid solutions has been approximately evaluated by means of measurements on compressibility and calculations of internal pressure. An analysis of the factors inducing hardness in certain completely isomorphous solid solutions has shown that only a small fraction of the total hardness can be ascribed to the attraction between unlike atoms, but it is pointed out that this attraction is largely contributory in producing slip-resistances of a purely crystallographic nature.

It is suggested that the concept of atomic volume as applied to alloys has certain serious limitations, and that a complete analysis of the factors inhibiting slip should be in terms of force fields.

## TWINNING IN COPPER AND BRASS

By Albert J. Phillips

The literature on twinning in copper, of which a review is given in the introduction to this paper, is conflicting and this work was undertaken to determine definitely the character of the familiar bands in recrystallized copper and alpha brass. Stereoscopic projection was chosen as the best means of expressing the results of the investigation. Details of the investigation are given and the author concludes that his results are convincing proof that the bands commonly occurring in copper and brass are twins of the spinel type, and suggests that bands of similar appearance in other metals of the face-centered cubic lattice are due to the twinning, by the same law.

## NON-FERROUS SECONDARY METALS RECOVERED IN THE UNITED STATES

By J. P. Dunlop

This paper is a statistical survey of the secondary metal trades in the United States, similar to those published annually by the U. S. Bureau of Mines. The author describes the work of the Bureau in covering this industry and gives figures on the quantities of metals recovered since 1910. The metals covered are copper, brass, lead, zinc, tin, antimony, aluminum and nickel.

## SAMPLING AND EVALUATING SECONDARY NON-FERROUS METALS

By T. A. Wright

The sampling of waste materials containing copper, lead and tin is of increasing importance because of the widening market for such material and the need for closer estimates of its value. While increasing care is used in classifying the increased use of complex special alloys makes sorting and grading more difficult, since turnings, borings and clippings are difficult to keep separate. Copper and lead waste are more and more being sold on actual metal contents as determined by analysis. Two tables show the classes of material in which selection has greater importance and of which definite proportions should be taken respectively. For the first class hand work is unavoidable, for the second definite schemes of sampling may be outlined, the size of the sample depending on the percentage of free metallics and the particle size. Eliminating oil and grease, removing iron, size of the sample, melting equipment and practice and preparation of sample are next discussed. The remainder of the paper is devoted to discussing the various classes of material that it may be required to sample.

DISCUSSION

One of the members present outlined a very interesting method of sampling copper bearing scrap in large lots and the mixture was in a general way as follows:

1. Drying test in a steam dryer on 1000-pound sample to determine moisture.
2. Burning test on same sample to determine combustible material.
3. Rejection of worthless material such as iron, lead, etc.
4. Grinding in a special ball mill before sampling. This mill must be thoroughly cleaned out after each run to avoid contamination of samples.
5. Melting test on one sample for metallics. Sampling of lead can be carried in much the same manner as shown above except that a sweating test is substituted for melting to recover clean metallic content.

A method was given for sampling battery plates. It consisted of taking every fifth or tenth shovelful until a sample of 1000 pounds was procured. Metallics were obtained by melting in iron kettles, and the remainder skimmed, ground, sampled again by coning and quartering and analyzed.

## CLASSIFICATION AND PREPARATION OF NON-FERROUS SCRAP METALS AND ALLOYS

By H. F. Seifert

The author describes the method of classification in use in the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. The object of this careful classification is to segregate materials which depreciate in value when mixed. Maximum salvage value is obtained only when various types of scrap are kept separate.

This segregation is not difficult but calls for careful watching and the prevention of carelessness in the plant.

## MODERN NON-FERROUS SECONDARY METAL PRODUCER

By Don C. Blackmar

Constant economy is necessary if the modern non-ferrous smelter is to succeed. This is actually realized by continual close supervision, observation, and constant seeking and testing of new ideas. Experience has shown where losses are greatest, and they can be very serious even though not at all apparent to the untrained eye. An example of this is volatilization loss, which is reduced to a minimum by recovering the metals in fumes from all the smelting furnaces in Cottrell electric-precipitation in-

stallations. The precipitates are principally mixtures of zinc, tin, and lead oxides, and after removing the zinc as sulfate, for which there is profitable market, the other oxides are again charged to the dross furnaces.

A similar example of cost reduction consists of so preparing furnace slags that they may be sold for use in other industries. Even the aluminum-oxide screenings find occasional users in the chemical or oil-refining industries. Sivlerplated tableware and other silver-bearing scrap are carefully segregated and sold to refineries. Special processes are constantly devised for separating mixed wastes, such as those produced in the automotive industry, where borings from babbitt, brass, iron, wood, aluminum, solder, and zinc, may be mixed in any combination of two or three metals, and possibly soaked in oil.

The industrial plant that attempts to recover its own non-ferrous waste materials would do well to ascertain if its operations are really profitable. Very often the industrial plant obtains several products from attempted salvage of a given item; one high grade, for re-use; the rest, too low grade to bring much revenue when sold. If the uncontrolled losses, high labor costs, due to lack of experience, and depreciation in value of the low-grade material, which must finally be sold, are all considered, it would probably be discovered that the operations show no profit whatever, or even considerable loss.

The secondary smelters are paying more today for non-ferrous wastes of all kinds than ever before, and selling high-grade products on a much closer margin than formerly. There can be but one answer: That the modern secondary producer is efficient and economical, and is recovering everything recoverable—getting all the value possible out of all the material handled.

DISCUSSION

Mr. Darby read a written discussion discussing the question of the recovery of metal from brass and bronze slags. He pointed out that much of the tin in these slags was lost, and recommended strongly that where slags of this type were produced, they had better be sold to smelters equipped to handle them rather than being treated in a haphazard manner. The seller would probably realize more in this fashion even though he paid the profit of the smelter.

Mr. Clamer described the work under way of the American Society for Testing Materials in standardizing the market quotations for ingot metals produced largely from secondary material. These quotations it was hoped would eventually be in some standard terminology referring to definite specifications and use by the trade, rather than the loose designations of metal content now in vogue. In other words, instead of giving the price for 85-5-5-5, the purity of this alloy would be stated giving the allowable limits of impurities and perhaps some physical requirements. For a discussion of this subject, see THE METAL INDUSTRY for October, 1927, page 426.

### THE CAUSE OF TRANSLATION STRIAE AND TRANSLATION STRAIN-HARDENING IN CRYSTALS

By M. J. BUERGER

A purely speculative paper, without essential experimental backing, which represents an attempt to explain hardening and slip-striae production, assuming the ideal conditions of equilibrium crystalization. The assumption of equilibrium is essentially a simplification in the development of the hypothesis. In so far as actual conditions may be found to depart from the assumed ideal conditions, to just such a degree must the hypothesis be modified to include such irregularities, should its general outlines meet with any favor. One of the chief objections to this hypothesis is that there is no experimental evidence for a regular arrangement rather than a random arrangement of solute atoms in a dilute solid solution and that, moreover, certain investigations point to a random solute atom disposed in unannealed metals.

### GRAIN GROWTH IN METALS CAUSED BY DIFFUSION

By FLOYD C. KELLEY

This paper describes the role that diffusion plays in grain growth. It discusses the diffusion of metals in iron, method of grain growth, forces of diffusion, different forms of grain growth and recent work in Germany dealing with diffusion of chromium, aluminum, tungsten, molybdenum and silicon into iron and chromium into nickel. The author states that this is a fertile field for future investigation and that the object of his paper is to create an interest that will lead to further investigation by others.

### THE CONTAMINATION OF METAL SCRAP, ITS EFFECT ON THE VALUE, AND SUGGESTED MEANS OF CONTROL

By CARL O. THIEME

A paper dealing with the various forms of contamination found in non-ferrous metal scrap, with particular reference to cause of contamination, viz.: variety of new alloys fabricated, production methods, carelessness, ignorance and unsuitable means of refining. Illustrations of contamination, its effect on the value and the desirability of the material to the smelter are given with a desire to increase the value of the scrap and eliminate economic loss.

### SECONDARY ALUMINUM

By T. D. STAY, D. B. HOBBS AND H. O. BURROWS

This paper gave a complete and quite detailed description of the smelting and re-melting of secondary aluminum materials. The authors pointed out that the refining of such materials was limited in character as impurities could not be removed. However, the ingot in such cases could be used as remelted No. 12.

A melting practice was described for metallic scrap and also methods of recovery of dross, using as a flux zinc chloride.

This paper was not preprinted but was read from manuscript. Reprints will be published at an early date and will be reprinted in full or in abstract in THE METAL INDUSTRY.

### MAGNESIUM—ITS ETCHING AND STRUCTURE

By H. B. PULSIFER

About fifteen varieties of the best magnesium available were prepared and subjected to etching tests, and then examined for microstructure. More than thirty etching reagents were tried, and those which contained ammonium salts were most satisfactory. The author describes the effect of the etching reagents, the structures obtained, densities and hardnesses, and also some work on magnesium aluminum alloys.

### ALUMINUM-BERYLLIUM ALLOYS

By R. S. ARCHER AND W. L. FINK

Aluminum beryllium alloys offer commercial possibilities particularly in view of the fact that methods have been developed recently for the electrolytic production of beryllium, and if worked on a large scale will bring cost down to a point which would allow the metal to be used commercially. The authors describe the properties of beryllium, giving a short survey of the literature on aluminum beryllium alloys, the preparation of alloys, analysis, hardness and age hardening of aluminum-beryllium alloys, solid solubility of beryllium in aluminum,

thermal analysis and a revised constitution diagram and the structure of aluminum-beryllium alloys. The tensile and hardness tests of aluminum-beryllium alloys, density, aluminum-beryllium-copper alloys, and salt spray corrosion tests of the binary and ternary alloys are also described.

### ANNUAL LECTURE

The annual Institute of Metals Lecture was given this year by Dr. C. H. Mathewson, of Yale University, on Twining in Metals. Dr. Mathewson's lecture was not pre-printed, but will appear at an early date. An abstract will appear in a later issue of THE METAL INDUSTRY.

### MANGANESE IN NON-FERROUS ALLOYS

By M. G. CORSON

This paper gives a systematic description of the properties and uses of alloys other than manganese bronze, manganin and duralumin. It describes the properties of manganese, manganese as a scavenger, the copper-manganese series, valuable properties of the copper-manganese alloys, ternary copper alloys containing manganese, Heusler alloys (Mn 15, Al 10, Cu 75) manganese alumium alloys and manganese silver alloys.

### ALPHA PHASE BOUNDARY OF THE COPPER-NICKEL-TIN SYSTEM

By WM. B. PRICE, C. G. GRANT, AND A. J. PHILLIPS

1. The 800° C. isotherm of the alpha phase boundary of the copper-nickel-tin system was determined as shown in Fig. 10.

2. Hansen's determination of the alpha phase boundary at low temperatures for the copper-tin system has been confirmed.

3. A wide range of hardenable copper-nickel-tin alloys has been discovered.

When starting this work, it was our intention merely to determine the single isotherm, but the very interesting hardenable alloys discovered have encouraged us to do further work and we now contemplate the locating of the phase boundary over its entire range. Later, we hope to publish the results.

### PURIFICATION OF SIX PLATINUM METALS

By EDWARD WICHERS, RALEIGH GILCHRIST AND W. H. SWANGER

The purpose of this paper is to set forth the matters of principal interest in connection with work done in the past few years on the purification of the metals in the platinum group, including the study and modification of the methods already in literature, and the development of new procedures. The results are given in summary form reserving the publication of the detailed data and directions for a forthcoming paper to be issued by the Bureau of Standards. The paper covers the treatment of platinum ore, the purification of platinum, palladium, rhodium, iridium, ruthenium, and osmium.

### DISTRIBUTION OF TENSILE STRENGTH IN HARD DRAWN COPPER WIRE

By FRANK W. HARRIS

In this investigation, various types of copper rod and hard drawn wire have been treated in dilute nitric acid in such a manner as to remove successive layers of metal from the surface. By testing batches of these after varying periods of immersion in acid, it has been possible to obtain a measure of the tensile strength of different portions of the sections. These have been plotted diagrammatically.

The results of the experiments show that the strength of hard drawn wire and commercial hot-rolled rod is by no means constant throughout the section. The "skin" of the wire is, in general, below the average for the whole. There appears to be a point of low strength at the axis, but the method of testing adopted does not permit complete exploration of this area.

The region of highest strength appears to be in a zone near the core.

Commercial hot-rolled rod shows a variance of strength throughout the section, being lowest at the outer zone and highest at, or near, the core. Annealed rod, however, is almost uniform throughout.

The effect of one draft on commercial soft copper rod is to raise the strength of the skin above the average for the whole wire. Further drafts bring about the same conditions as before.

The effect of bending a hard drawn wire into a small coil is to lower the average strength and develop a more uniform condition throughout.

When wire is drawn continuously in one direction to the penultimate die, and then the drawing direction reversed in the final die, the result is an increase in skin strength, the remainder of the section being unchanged.

While X-ray studies have been shown to reveal a "preferred orientation" of the crystals at various points in the section of the hard drawn wire, microscopic studies do not show any essential change in crystal structure at any point, corresponding to zones of high and low tensile strength.

Two common causes of defective wire are discussed; namely, laminations and overdrawing.

### REFINING AND MELTING SOME PLATINUM METALS

By J. O. WHITELY AND C. DIETZ

This is an outline of the refining methods used in commercial reclamation of platinum scrap. The author takes a concrete problem of 100 ounces of miscellaneous scrap made of jewelry, dental scrap and laboratory ware, containing platinum, palladium, iridium, ruthenium, rhodium, gold, silver and copper, and follows through giving methods of separation and refining.

### THE PLATINUM METALS AND THEIR ALLOYS

By FREDERIC E. CARTER

This paper first discusses the sources of platinum and then takes up its metallurgy. A brief statement on melting, working, soldering and welding is followed by a table of the physical properties of the metals of the Pt group and more detailed discussion of the effect of gases on the Pt metals, of metallography, spectrography and of alloys. A list is given of the Pt alloys that (1) have some commercial use; (2) are used in the separation of the metals; or (3) are formed during the working of the metal. Each of these is discussed in some detail. Iridium, osmium, palladium, rhodium and ruthenium are next taken up and discussed. No attempt is made to discuss the ternary and quaternary alloys as a theoretical group, but some of them are discussed in the concluding section of the paper, which deals with the uses of the metals and alloys of this group.

### MANUFACTURE OF STERLING SILVER AND SOME OF ITS PHYSICAL PROPERTIES

By ROBERT H. LEACH AND C. H. CHATFIELD

This paper gives a brief summary of the process of manufacture of sterling silver, and some of its more important physical properties, as observed in the commercial production of rolled sheet and wire. The equilibrium diagram of copper-silver alloys is given and melting and casting are discussed; after which rolling and annealing are taken up. Next the physical characteristics and their effect on working are discussed. The etching of the metallographic specimens is described, the authors found that a mixture of chromic acid and potassium dichromate

gave the best results in bringing out the structure of the solid solution. The structures observed are shown in 15 figures, and the authors believe that the solubility of copper in silver at 1400° F. is much greater than the equilibrium diagram indicates.

One of the members present recommended the addition of a small quantity of 15 per cent phosphor copper in melting sterling silver.

### CORROSION OF METALS AS AFFECTED BY TIME AND BY CYCLIC STRESS

By D. J. McAdam, Jr.

In this investigation of the effect of cyclic stress on corrosion, the stress is used below the corrosion fatigue limit. The results of the investigation, therefore, should lead to better understanding, not only of corrosion fatigue but also of the behavior of metals under ordinary service conditions in which the cyclic stresses do not exceed the corrosion fatigue limit. The effect of corrosion on the fatigue limit has been given chief consideration. In addition, ordinary fatigue and corrosion fatigue tests were made with each material.

The materials worked with were chrome, vanadium steel, stainless steel, aluminum bronze, nickel copper alloys, Monel metal, cupro nickel, copper, Muntz metal and aluminum alloys.

### GOLD, SILVER, COPPER ALLOYS

By Frederic E. Carter

This paper is a record of practical tests made on the 14-kt. and 18-kt. series of alloys, not a critical study of them. A series of 15 alloys of 14 kt. are reported on as to color, specific gravity, Brinell hardness, both rolled and cast, tensile strength, ductility, melting point, electrical resistance, and e.m.f. A similar set of results are given for 18-kt. alloys.

In response to a question by the author of this paper, one of the audience stated that a good etching reagent for gold alloys consisted of equal parts of ammonium persulphate and a 10 per cent solution of potassium cyanide.

### THE USE OF NOBLE METALS FOR ELECTRICAL CONTACTS

By E. F. Kingsbury

The author describes the use of the noble or precious metals for electrical contacts, covering erosion of these electrodes under various conditions. Several types of erosions are discussed and an outline given of the complicated behavior of the noble metals as electrical contacts in circuits of special interest to communication engineering.

### METALLURGICAL PROPERTIES OF PRECIOUS METALS AND THEIR ALLOYS WHICH AFFECT THEIR USE IN DENTISTRY

By Reginald V. Williams

The business of manufacturing dental alloys is highly specialized. It is an infant industry. The demand for dental golds has increased in direct ratio to the practice of dentistry. Today more than 10 per cent of the population use tooth brushes and periodically visit their dentists, whereas a few years ago the percentage was only a fraction of that amount. Contrary to general opinion, gold alloys are being used in increasing amounts, although in better dentistry they are concealed when possible under porcelain, rubber or Bakelite preparations.

The economic importance may be summarized as follows: Dental gold sales amount to at least $25,000,000 annually. If the value of gold in a restoration amounts to a dollar, the dentist's fee for his materials and time spent in making the restoration amounts to at least $10. Thus, dental fees for gold work alone total at least $250,000,000 annually. The gold sales of dental depots or distributors, of which there are at least two or three in every city, amount to 25 or 30% of their entire turnover.

### APPLICATION OF A HIGH-VACUUM INDUCTION FURNACE TO THE STUDY OF GASES IN METALS

By P. H. Brace and N. A. Ziegler

1. A high-frequency vacuum furnace has been constructed capable of melting 13 lb. (6 kg.) of iron and maintaining it at temperatures above 1600° C. under a pressure less than 0.0005 mm. of mercury.

2. An analysis system has been constructed for analyzing quantitatively the gases from the furnace with respect to $H_2$, $N_2$, $O_2$, $CO$, $CO_2$ and $H_2O$. The separation of the mixtures into their components is accomplished by selective condensation and combustion and volumetric measurements for estimating quantities.

3. The technique of furnace operation and gas analysis has been described.

4. Experimental data showing the results obtained from the analysis of gases from iron are presented and certain consistencies are pointed out.

## Pewter for Rolling and Spinning

Q.—The following mixture has been given to us for producing rolled pewter which is to be spun into lamp shells: Tin, 94; antimony, 5; copper, 1. We operate our own mill, but this is new to us and we should like to know if the mixture is good for rolling and spinning. Furthermore, can you tell us of an element which will turn the alloy slightly red? We wish to get away from the white color but not as deep red or bronze.

A.—Your mixture is very nearly the same as the English pewter, which is tin, 81.2; antimony, 5.7; copper, 1.60; lead, 1.15. The fracture in your mixture is coarse and strongly crystalline, and as a rule is a little brittle to work to advantage. The metal is such that in rolling out to sheet, the edges show cracks. It is important that zinc and iron be kept out of the alloy if possible. Add 1% lead to your mixture and it will help in rolling.

In reference to color, the addition of copper gives to the color a strong yellowish cast and an addition of lead is advantageous as the metal is more fusible and helps in rolling. The color acquires a strong brownish cast and loses its lustre on exposure to the air more quickly.—W. J. Reardon.

## Standardization Progress

At the third preliminary conference of manufacturers of vitreous china, solid porcelain and enameled iron plumbing fixtures, held at the Department of Commerce on January 11th, 1928, a tentative simplified practice recommendation was developed covering overall dimensions for hospital plumbing fixtures. The schedule is now before the hospital authorities for their review and recommendation as to definite sizes and heights.

A representative number of manufacturers and users of polishing and buffing wheels have expressed the opinion that the principles of simplified practice could be applied to these commodities. To that end it has been proposed that the manufacturers make a survey of present production and demand, as a basis for establishing a simplified list of sizes.—Monthly News Bulletin of the Commercial Standards Group, Bureau of Standards.

# Mummy Preserved by Copper

In the Chilean section of the American Museum of Natural History, New York City, there lies in a glass case the body of a prehistoric copper miner which has been kept in a state of almost perfect preservation by a natural process of impregnation with copper salts. This occurred after the miner had been intombed in an accident. For some hundreds of years the body has thus been held intact, and it will probably remain so perpetually, according to the scientific authorities at the Museum.

The body, generally termed a "natural mummy," was discovered on November 22, 1899, during operations at the Restaurada copper mine at Chuquicamata, in the Desert of Atacama, Chile. Its discoverer, a Chilean miner in the employ of Maurice Pidot, a French mine operator, stated that he had unearthed the body some six feet underground, lying prone on its back. It has been kept in as near the original position as possible (see Fig. 1) and it is evident that the aboriginal miner, grubbing into the side of a low hill, after the practice of the miners of his time, met with disaster when a sudden cave-in occurred. His posture when discovered indicated that he had been actively scraping or chiseling at the ore high up in front of him. His hands are still in the position of holding a hammer and chisel. About his feet were found a number of implements (Figs. 2 and 3). The cave-in, while apparently succeeding in smothering the man, did not crush him very noticeably.

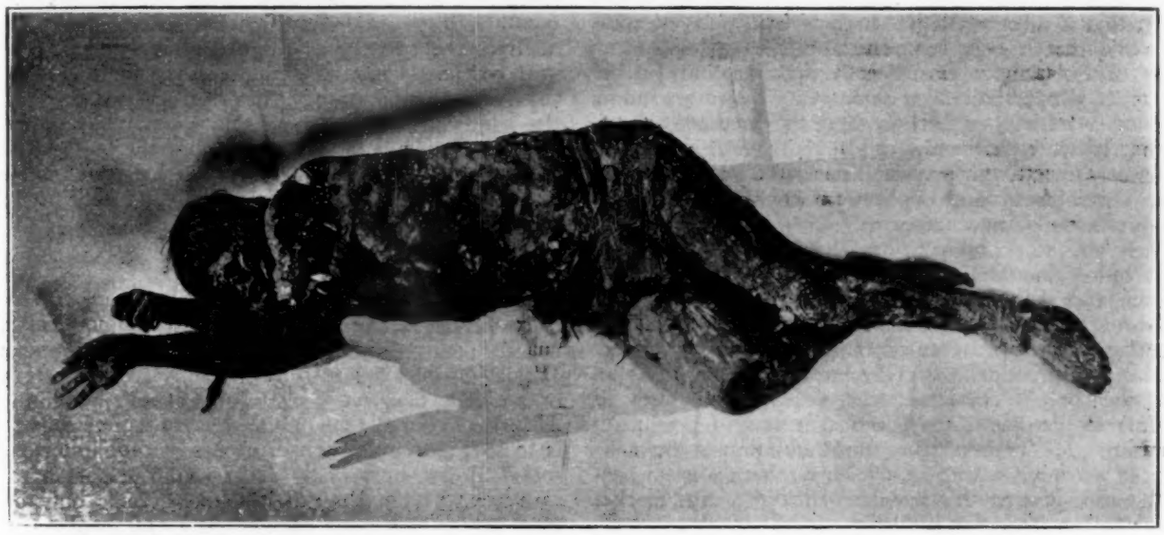


FIG. 1—PREHISTORIC CHILEAN MINER, MUMMIFIED BY NATURAL COPPER IMPREGNATION

FIG. 2—HAMMER AND WEDGES

Other similar mummies have been unearthed in the Chuquicamata district as well as in other parts of South America where copper mineral exists. In practically every case the preservation has been effected by impregnation with copper. The mummy here discussed, for instance, is coated and, as it were, soaked in anhydrous sulphate of copper (brochantite) and sulphate of copper (blue vitriol), with both of which preservatives the earth surrounding the body was well supplied.

There is no very definite indication of the year in which this miner lived and worked; a trace is to be found in the fact that his implements were certainly made before the introduction by the Spaniards of the metal tools which the natives immediately adopted and used thereafter. This would give the mummy at least 350 years of existence; and there is no means of knowing, the archeologists state, how much longer than that the "copperize of" mummy lay in the earth.

In speaking of the implements used by these Indian miners, it is interesting to state their method of operation. By means of spades and chisel they would burrow into the hillsides where copper was known to exist, and, by dint of much chiseling and scraping, they would loosen from the cleavage faces of the rock as much of the ore as they could. The ore was in the form of green and blue powder; it was gathered in baskets and carried out of the open-face diggings, to be reduced by some method which was probably even more primitive than their means of ore gathering. This, then, was the sort of mining in which this man whose mummified form is held intact by copper deposition was engaged.

His stature was small, and the body now weighs only sixty pounds. It is partially clothed in materials which display evidences of considerable skill in spinning and weaving. His long, black braided hair, small feet and hands, and generally rounded and diminutive body caused this mummy to be considered a female for many years, but it has been definitely determined by anthropologists that it is the body of a man.

The mummy was for a time displayed in various parts of the United States as a Curio. In 1905 it was purchased by the late J. Pierpont Morgan, who gave it to the Museum. We are indebted to the Museum for permission to reproduce the illustrations on this page.

FIG. 3—SPADE AND SCRAPER

# The Development of the Aluminum Industry

## Its Growth from a Laboratory Curiosity to a Great Manufacture

By ALUMINUM MAN

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

Commercial production of aluminum by the Hall electrolytic process which first took place in this country about forty years ago marked the commencement of a new basic industry. Other non-ferrous metals such as copper, tin, lead, zinc, etc., had been known and used for centuries. Iron and steel were also common in their application and the Steel Age was just in its beginning.

Even before 1825, when Oerstedt succeeded in producing a tiny button of metallic aluminum, scientists had known that a metal with its characteristics existed some place, and that it only remained for them to discover a means of isolating it in order to examine and further catalog its properties. For some sixty years aluminum remained a laboratory product and the methods of extracting it were not only crude, but very expensive. Here was a metal whose possibilities were unlimited, and whose development and application would open up tremendous fields of new uuses.

When you stop and consider the fact that aluminum occurs more abundantly on the earth's surface than any other metal and that it is the third most common element in nature, it is small wonder it fired the imagination of more than one man. One of these was Charles Martin Hall, a young student in Oberlin College at Oberlin, Ohio, who in 1886 commenced his first research work in an effort to discover some practical means of producing aluminum. He realized that until aluminum could be produced cheaply, as well as efficiently, there was no possible hope of placing this wonderful metal on the market and furthering its use in industry.

Many men have said that in their youth they obtained much inspiration from the family woodshed. Perhaps it is significant that young Charles Martin Hall, still a student in Oberlin College, chose his father's woodshed as the scene of his laboratory experiments. After much work and thought and collaboration with the professors at Oberlin, with whom he shared his ambition, young Hall finally one day extracted from his crucible a small piece of aluminum about the size of a pea. He had gone after the problem from an electrolytic standpoint, and in his woodshed laboratory had rigged up his crude, but effective apparatus. In those days central power plants, while not entirely unknown, were nevertheless not common and there was no net-work of power lines stretching all over the country as there is today. Hall, therefore, secured the electric current necessary for his experiment from home-made storage batteries. When one considers the handicaps under which this young man labored, the fact that he had no means and that the tools he worked with were home-made, one cannot help but admire the courage and spirit which led him on until he finally succeeded in doing what he set out to do.

### ALUMINUM ORES

It has already been said that aluminum is the most common metal and the third most common element in nature (only oxygen and silicon are more abundant). Possibly many have also heard the statement, at one time or another, that every clay bank is an aluminum mine. This is, of course, true only in a comparative sense. That is to say, aluminum, which occurs as aluminum oxide, is found almost universally and is a large part of a good many clays. On the other hand, there is only one ore from which it can be economically extracted on a commercial scale at the present time. This ore is commonly known as bauxite and takes its name from the town of Beaux in France, where it was first discovered. There are bauxite deposits in the United States, in South Amer-

A ROOM WHERE ALUMINUM PAINT IS APPLIED AT THE WESTINGHOUSE AIRBRAKE COMPANY'S PLANT

ica, France, Italy, Germany, Russia and other countries.

Bauxite varies somewhat in color and appearance. Some of it is a sort of reddish brown and other bauxites are a dirty gray color. In its natural state bauxite contains approximately 20% of aluminum, not, of course, as such, but in the form of aluminum oxide. The largest deposit of bauxite in the United States is located at Bauxite, Arkansas. The ore from this locality is of the reddish brown color and looks much like ordinary red clay.

### EXTRACTION OF ALUMINUM

Inasmuch as only a part of the bauxite is of any use the first step in the process of making aluminum is to get rid of the waste material and concentrate the ore. In order to accomplish this the bauxite is first of all ground to flour fineness and placed in a tank called the digestor. The digestor contains a soda ash liquor, and after the ground bauxite is introduced the tank is closed and sealed and for a period of approximately one hour is thoroughly agitated and mixed by steam at 90 pounds pressure. The purpose of this treatment is to obtain a solution of aluminum oxide.

The liquor is drawn off from the digestor and passes through a series of filter presses, where the organic matter and other waste materials are separated and there remains for further treatment a pure solution of aluminum oxide. From the filter presses the clear liquor is led to a large preciptating tank where it is allowed to stand for some forty-eight hours. At the end of this time the aluminum oxide has settled out at the bottom of the tank. The oxide contains a large amount of chemically combined moisture as well as free water and is, in this state, commonly known as aluminum hydrate. After the settling period and after the hydrate has collected at the bottom the liquor is drawn off the top of the tank and the aluminum hydrate conveyed to a second bed of filter presses, where as much additional liquid as possible is removed.

Having been treated for a second time in the filter presses the aluminum hydrate is conveyed to calciners. The calciners are large revolving cylindrical drums, similar to those seen in cement plants. They are about 125 feet long and 10 feet or 15 feet in diameter. In the calciners the hydrate is subjected to a very high temperature and all the remaining moisture is driven off. The resulting product is pure aluminum oxide. This aluminum oxide, or "alumina," contains approximately 50% of aluminum and is a fine white powder, somewhat granular in texture and about the consistency of dry table salt.

So much for the preliminary steps in the manufacture of aluminum. The most difficult part of Mr. Hall's experimentations was development of a means to convert aluminum oxide into aluminum. As already indicated, Mr. Hall's process involved the use of electricity; in fact, it is fundamentally an electrolytic process. Naturally, the method employed by Mr. Hall has been considerably refined, but the basic principle is the same and today all aluminum is produced by means of the Hall process.

After the aluminum oxide comes from the calciners it is shipped to the various reduction plants. Obviously, since the Hall process requires electric current it is only logical that the reduction plants should be located near sources of hydro-electric power. Without going into involved technical details, the furnaces are large rectangular iron containers lined with carbon. Over each furnace carbon rods are suspended. The furnace itself is the cathode and the carbons are the anode. The furnace is filled with a mixture of cryolite and aluminum oxide, the carbons lowered into the mixture and the current turned on. The resistance offered to the passage of the electric current generates sufficient heat so that the whole bath becomes molten. In this molten state cryolite has the property of dissolving aluminum oxide.

After the aluminum oxide is in solution electrolytic action takes place, and the aluminum is deposited out on the bottom of the furnace in a molten state. The action is much the same as that which takes place when one metal is plated on another. Aluminum, though light, is heavier than the bath in which it is produced, so that, as indicated, it sinks to the bottom where it is allowed to accumulate and is drawn off from time to time and poured into moulds.

### COMMERCIAL DEVELOPMENT

Mr. Hall having discovered a method which gave promise of being adaptable to commercial practice had only won a part of the battle. It remained for him not only to interest capital in his venture, but also further to develop his process until it could actually be called commercial. After several years of discouragement tempered with a reasonable amount of success, Mr. Hall finally interested Pittsburgh capital in his venture and a company was formed in the Pittsburgh district.

Mr. Hall gathered around him a number of other young men whose enthusiasm and capacity for sustained effort were second only to his own. Many problems confronted them, but in spite of every discouragement they kept on until they succeeded in building from their slender beginnings what is now one of the most important industries in the world and which turns out a product which is widely used by almost every other industry.

Having established a going concern which was turning out aluminum produced on a commercial scale there still remained one most important problem to be solved. One evening after the entire day's production, amounting to something like ten or fifteen pounds, had been brought in a wheel-barrow from the plant into the office where it was locked up in the office safe for the night, one of the young men remarked to the others: "Well, we have ten pounds of aluminum, but what in the world are we going to do with it?" That remark told the whole story, for it was exactly the situation in which they found themselves. The uses for aluminum were altogether potential. Of course, prior to this time some aluminum had been produced by laboratory methods, but it was so expensive that it could only be used in the manufacture of trinkets and jewelry and things of that sort. Obviously, there was not sufficient outlet along these lines to take the production which was now available and which would continue to increase. It was therefore necessary for a market to be established, and this is just exactly what was done. In a manner of speaking a pound of aluminum was produced and then somebody went out and found a use for it and it was sold for that particular purpose.

An outstanding illustration of this point is the cooking utensil business. There is no metal or material better suited for fabrication into cooking utensils than aluminum. After certain experiments were made it seemed advisable to make cooking utensils, not only in order to utilize some of the aluminum production, but also to show others what could be done with it. The cooking utensil industry today, both in this country and abroad, consumes millions of pounds of metal in the form of sheet and castings. The industry had to be pioneered and the pioneering was done by Mr. Hall and his associates.

From this small daily output of a few pounds the aluminum industry has grown until today the world's production is something in excess of 425,000,000 pounds annually. The use of aluminum has spread into almost every industry. New applications and uses are found almost daily.

**This article will be continued in an early issue.—Ed.**

# Electric Smelting Advancement

## Recent Developments in the Induction Furnace and the Progress It Has Brought About in the Melting of Metals—Conclusion*

By G. H. CLAMER,
President, The Ajax Metal Company

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

CORELESS INDUCTION TYPE FURNACE (AJAX NORTHRUP)

The submerged resistor type of furnace has limitations in practice resulting from the necessity of using a submerged resistor as the heater. A certain quantity of metal in a liquid condition must be maintained within the resistor channel and sufficient depth in the bath above the resistor channel to maintain the secondary circuit. This necessity reduces the flexibility of the operation in respect to mixture changes. The composition of the metal remaining in the furnace must be such that it can be converted into the next charge, or else the furnace must be completely emptied and metal of the composition next to be melted must be poured into the furnace from an outside source. Furthermore, if the metal is entirely poured out and the refractory lining allowed to cool, it is apt to crack on re-starting.

This necessitates the continuous application of power to the furnace. The amount of power necessary to maintain the temperature in the secondary channel, however, is not great. The induction form of furnace, even in nine hours per day service with a holdover of fifteen hours per day, is a very efficient melting equipment.

In the coreless induction furnace the necessity for a resistor channel is avoided. In such a furnace the ordinary type crucible can be used, or in large furnaces a hearth approximating the ordinary crucible dimensional proportions, or a more shallow hearth if such is desired. In such a furnace the melted charge can be completely emptied.

The coreless induction furnace requires the application of current at a frequency above normal. This means a motor generator set in the circuit together with static condensers for power factor correction. The installation of a furnace of this kind is therefore more expensive than that of the submerged resistor type furnace, but under certain existing conditions this additional cost is warranted. If a number of such furnaces are attached to a single generator, the cost per furnace is reduced to a figure approximating that of the submerged resistor type furnace. On the other hand, if there is only one furnace to be operated, the cost of the one unit is proportionately high.

The coreless type induction furnace is no doubt of greater interest to the ferrous metallurgist than it is to the non-ferrous metallurgist, but its application in the ferrous field will not be discussed here.

In the non-ferrous field such furnaces have been used continuously for several years for melting nickel silver, bronzes and other high temperature alloys in the plants of one of our largest wrought brass producers. It has been used also for a number of years for large scale melting of Sterling silver and its alloys. More recently a crucible lift-out type of furnace has been designed, which should find useful application in melting small charges of metal, particularly in the jewelry trade for melting the precious metals. Small furnaces of this kind may be operated from relatively inexpensive static generators or frequency changers.

The coreless induction furnace now seems to be destined to take an important place in the ferrous field, and it is quite certain that it will have a distinct usefulness in a limited portion of the non-ferrous field. Its usefulness is not limited to melting, it can also be used for heat treating.

RESUME

The arc type of furnace has been highly developed in parallel with the induction furnace, and great improve-

* Parts 1 and 2 were published in our issues for January and February, 1928.

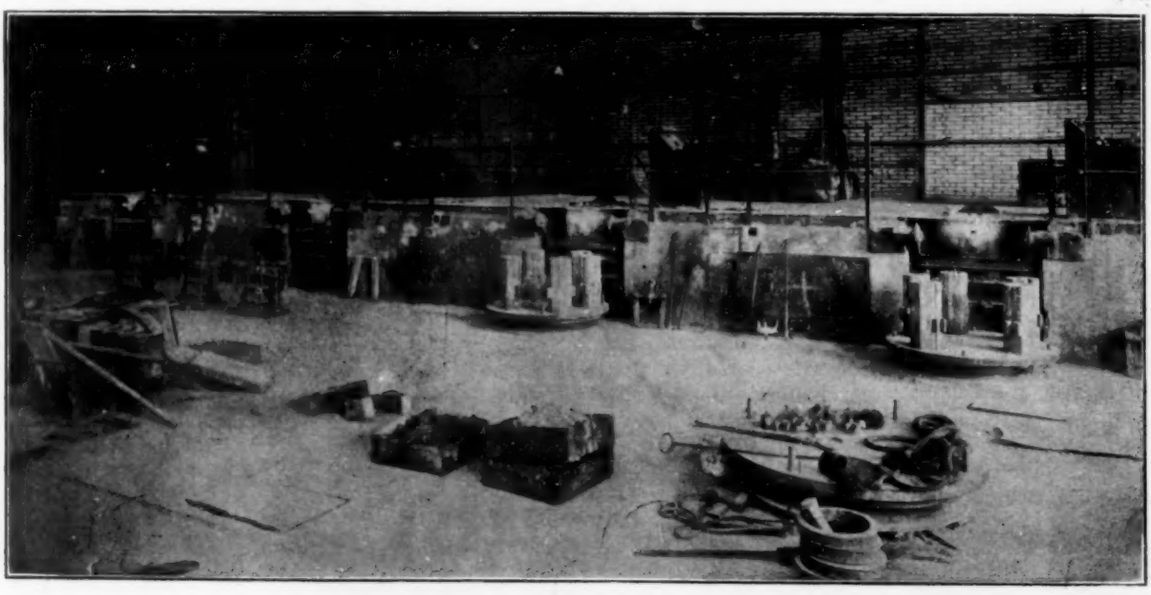


FIG. 1—AJAX WYATT FURNACES IN CASTING SHOP OF LARGE SWISS MILL

ments have also been made in the application of fuel oil and gas. Twenty-five years ago oil melting was practically in its infancy; gas melting was only used in the jewelry trade or in melting service where cost was not a consideration. Twenty-five years ago electric furnaces were scarcely thought of as a possibility for commercial melting.

The first commercial electrical melting began in 1915. Oil and gas fired furnaces are steadily gaining ground along with the electric furnaces in replacing coal fired furnaces. Oil and gas fired furnaces are sometimes installed in preference to electric furnaces because of their lower first cost, and the absence of standby cost for power. The installation of electric furnaces demands a good load factor (extensive use) to compensate for the high first cost.

An intelligent decision as to the choice of equipment for most economical operation requires a most careful consideration of all the factors involved, chief of which is load factor. To secure an advantage in melting cost, the first consideration should be given to the tonnage requirements per day, and the operating days per month. Should these be insufficient to warrant the investment cost of electric melting equipment and to satisfactorily absorb the standby charges imposed by the power company, a fuel fired furnace should be installed. If power is not purchased from an outside power company, the equivalent of a standby charge should nevertheless be considered.

In general, if electrical melting is under consideration, a volume of at least two tons of metal per day for 25 days in the month should constitute a minimum amount. This figure applies to brass melting as distinguished from melting of precious metals, etc. Standby charges are usually on a yearly basis, so that continuous operation of electric furnaces becomes of far more importance than for fuel furnaces. The electric furnace may be compared with the work horse. The work horse must be fed whether he works or does not. If he does not perform sufficient work, to use the old expression—"he will eat his head off." Just so with an electric furnace. If not sufficiently used, it will likewise "eat its head off."

The arc type furnace to attain efficiency approaching the induction furnace, requires a relatively higher connected load than the induction furnace. This means a relatively higher standby charge or idleness expense during periods of shut down. The submerged channel induction furnace, on the other hand, to be kept in immediate operating condition, must have sufficient power at all times applied to it to hold in a molten condition the metal constituting the secondary loop. In 24 hours per day operation, the induction furnace is unquestionably more efficient than the arc furnace, and is therefore under conditions of good load factor, the more desirable type of furnace. It is then entirely a matter of calculation to determine at what reduced load factor one or the other of these two types becomes the most economical in operation. On the one hand, the arc type furnace with its relatively high demand cost and its heating up cost after shut down, and on the other the induction furnace with its power input over a 24 hour period to maintain a molten secondary ring. Speed of melting leads to efficiency in melting. Namely, the higher the power input in proportion to the furnace holding capacity, the greater the melting speed. The idleness expense for high speed furnaces during periods of shut down is consequently greater than for furnaces requiring a smaller connected load.

The coreless type induction furnace may be operated with a high power input and requires no continuous application of power as does the submerged resister type furnace. This type of furnace may in these respects be compared with the arc furnace.

STATISTICS

Dr. H. W. Gillett, Chief of the Division of Metallurgy, Bureau of Standards, in his paper before the Twenty-Fifth Anniversary Session of the American Electrochemical Society, makes the following startling statements in regards to the progress of electric brass melting.

1,000 electric brass melting furnaces have been built in the United States both for domestic and export trade.

675,000 tons of brass, bronze and nickel silver were electrically melted in 1926, requiring 188,000,000 kilowatt hours.

These furnaces used $3,000,000.00 worth of electrical energy in 1926 and used 40,000 fewer tons of fuel to generate the electricity

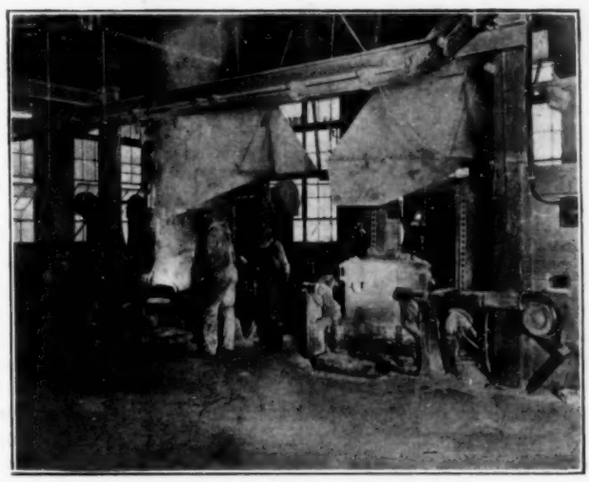


FIG. 2—TWO AJAX WYATT FURNACES AT PLANT OF SPEAKMAN COMPANY, WILMINGTON, DEL.

than would have been used direct in fuel fired furnaces, and saved 13,500 tons of metal that the fuel fired furnaces would have lost.

90% of the metal melted in the wrought brass industry is melted electrically. 30% of the metal melted in the brass foundry industry is melted electrically.

The saving in metal loss in 1926 was $2,500,000.00. It would have taken $1,000,000.00 worth of crucibles to melt the metal lost and $1,500,000.00 worth of fuel to melt it.

The above figures, which in 1927 have no doubt been greatly exceeded, vividly picture the tremendous advance made in the art of metal melting in the short period of about ten years by the introduction of electric melting.

## Removing Lead from Babbitt

Q.—Will you kindly suggest a cheap method of removing lead from babbitt metal having a lead content varying from 50% down to 2%. The original mixture of the metal we have was 85 tin, 7½ copper, 7½ antimony. Through carelessness in handling, considerable lead got into the reclaim.

A.—There is no cheap method of removing lead from babbitt metal composed of tin, antimony and copper. There is a method of removing copper and antimony but not lead. The only way you can use such a mixture in a tin base metal is to add a small amount at a time, as a small amount of lead does no harm but often is not allowed. Therefore, it must be used for babbitt metal where lead is allowed, or sweat in a sweating furnace and recover the tin and lead and use for solder of babbitt containing lead and tin made from same. The antimony and copper are remelted and disposed of to best advantage.—W. J. REARDON.

# The Fundamentals of Brass Foundry Practice

## A Description of the Basic Laws Which Control the Melting and Casting of Metals and Their Application to Practical Foundry Operations*—Part 15.

By R. R. CLARKE,
Foundry Superintendent

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

### VENTING THE MOLD

As stated before, the two gases that occur in a mold are heated air in the open mold and steam and volatile gas in the sand. The first is a quick, active gas, and is to be dealt with promptly. Vents for it should be fine and numerous, spreading over a broad surface and leading directly into the open mold from the top or side, or through the flask joints where the nature of the work requires it. In leaving the mold the hot air should be slightly crowded by the metal and kept above or ahead of the metal. Too

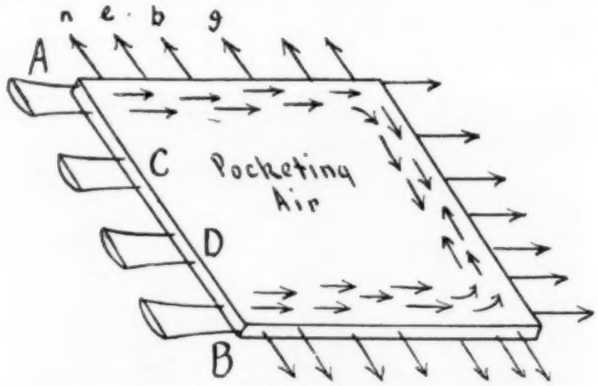



FIG. 52—THIN SQUARE PLATE, SIDE VENTED

free an exit, as through large vents or open risers, makes for strong air currents and for suction, which in turn might induce pocketing and trapping of air in the metal, as well as greater oxidation, collapse of delicate mold parts, localized deposits of dross, and other undesirable effects. Occasions occur now and then where full and free atmospheric venting is a benefit, as in the crown of thin metal high up in the cope of a mold, but in the average case a number of finer vents that just "ease" the gases off is the better practice. Pocketing of air in a mold which sometimes prevents thin castings from running can be caused by a vent which may direct gas currents to and past it to some unvented part of the mold where it pockets and displaces metal. Fig. 52, a thin square plate side vented, is another possibility. Gated at A and B and poured hard, the metal practically shuts off the escape of air and pockets it in the mold centre. With gates at C and D, these side vents n, e, b, g, etc., might be of some value.

The main effects of atmospheric gas on castings are shrunken copes, mis-run sections, entrapped air cavities and localized dross, as well as increased oxidation, overtaxed molds and sudden jar and explosion of gases resulting in the callapse of the mold, strained castings, run-outs, etc. This last condition arises when the gases accumulate under pressure then escape and "go off" suddenly.

Steam and volatile gases occur in the sand and must be kept away from the matal in the open mold. When these gas pressures increase unduly under the surface sand crust, the crust buckles, peels or lifts, and a scabbed casting results. If the pressure continues, the metal boils violently, tearing away the mold walls, and the "cut away" on the casting eventuates. If exerted on viscous or on plastic metal, the respective consequences are gas bubbles and indentations of surface. Sand gas vents should be main avenues for the gases that reach them through the permeability of the sand. They should be sized, placed and multiplied according to the varying volumes and pressures of gases arising from the differing bulks and surfaces of metal involved in the casting. They should always stop safely short of the open mold to avoid metal breaking into and clogging them; this might also create much more gas that would need to be eliminated. The sand "openness" is a factor in determining the vent frequency. A general principle of mold venting is that the more nearly a sand body is entirely surrounded by metal, the greater are the volume and pressure of gases generated in it. Fig. 53 gives an illustration of this principle in green sand molding. Gases developing in the green core are heavy and should be carried away by large vents to the bottom board, thence freely off to the atmosphere. In cores of this size and nature, the centre of the core should be of crushed coke or some other very open material.

Sand gas vents underlying the open mold should be amply sized and proceed to the bottom board where provisions for continuing the channel to the outer air should be made. Vents along the side of a mold should extend to the bottom of the pattern and be so spaced as not to overtax the gases in finding them through the sand. At the same time they should not be so close as to allow metal to break into them. In further reference to sand gas venting, it might be here observed that the "vented" flask, i.e., the flask with openings in its sides and end surfaces, has a distinct advantage over the unvented flask. Fig. 54 is a representative example of good practice in side and bottom venting of molds.

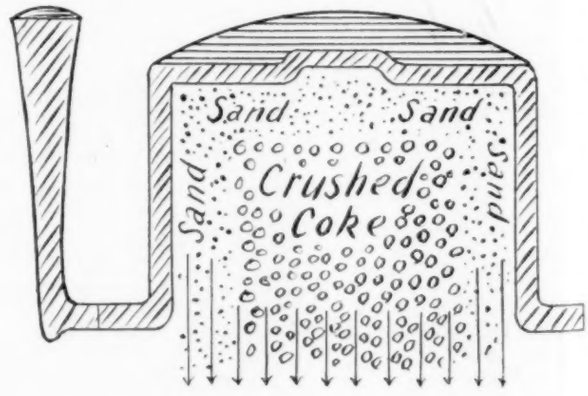



FIG. 53—LARGE CAP NUT.

* All rights reserved. This series will be collected and published in book form. Parts 1 to 14, inclusive, were published in our issues of July, August, September, October and November, 1926; January, February, March, April, May, August, September, November and December, 1927.

### DRY CORES AND MOLDS

Remarks so far on gases refer chiefly to the green mold and its green parts. The same general principles apply also to dry cores and to dry molds. Between the green mold and the dry mold the "skindried" mold is a marginal possibility. This skin dried mold is simply a drying and hardening of the surface crust of the mold and is made either with or without a thin facing; the surface of the mold is then painted or sprayed with water containing a binding and hardening element such as molasses and is then dried. The thickness of the crust depends altogether on the thickness of the facing or the depth to which the molasses water has penetrated. There is nothing arbitrary

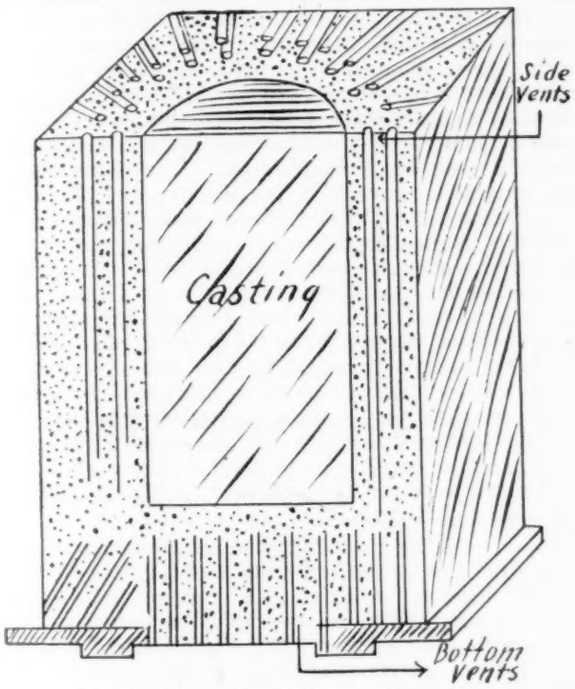



FIG. 54—VENTING AGAINST SAND GASES

about the facing used and it varies with the nature of the casting. A facing used by the author for average purposes consists of 5 parts molding sand and 2 parts sharp sand, to 30 parts of which is added 1 part binder such as flour or kordek. The drying is usually done either with heated plates or with a blow torch. In either case, care must be taken not to dry it too fast or play the flame too long on any given surface; this generates excess steam and results in the surface buckling and peeling. Too intense a heat, or too long an application of heat burns out the bond and leaves the sand in powder. When the surface of the sand will not yield to the touch, it may be assumed that the skin is sufficiently dried.

The skin dried mold is applicable to expansive surfaces, delicate surfaces and frail mold parts, and metal volumes lying between the green and the all-dry mold range. Judgment and experience must dictate its uses as well as its limitations. In any mold, whether skin dried or all dried, what the sand loses in moisture it gains in volatile bonds, as compared to green sand; and the gases, though of different nature, are no less dangerous. In the dry mold of bonded sand, the gases vary with the richness of bond, with its volatile nature, and with its state of "burned out" dryness. Venting is of greater importance in the bonded dry mold than the green, but the same general principles of practice adhere. In further reference to the skin dried mold it is worthy of mention that its limits can often be stretched by using a strong facing around the pattern and backing up with a very open sand. By this method the author has made many complicated and bulky copper castings weighing up to as much as one ton.

The all dry mold sand mix varies widely. All requirements are met by sufficient openness for the gases and enough bond to hold the sand together in drying and against the action of the metal. Just what these exact requirements are in different grades of work is a profitable foundry study. It is a dangerous and expensive folly to fall below them on the one hand, while it is rash to exceed them on the other.

### METAL GASES

Metal gases are those that generate within the body of the metal in its molten state and escape as the metal returns to a solid state. These gases are rather of a chemical or metallurgical than a physical consideration. They are seldom, if ever, of mold origin, and they have no effect whatever on the mold. They are, in short, a force inside the metal body working outward, and not a force outside working inward, as are the sand gases. They seem to be more partitioned or partitioning than the sand gases; gases that exist either in small individual particles unable to unite, or as parts of larger bodies that break up into these particles in escaping through the metal. Their effect on the casting is porosity of the honey comb type which permeates the metal throughout. An indication of their activity will most often be found in the pouring sprue head, which in cooling swells up instead of shrinking. The porosity indicates that the metal solidifies around many fine channels of escaping gas. To what extent these gases escaping through plastic metal are aided by the contraction of the metal is a question. In liquid metal, such as in liquid copper, the gases sometimes lift the metal bodily and cause it to flow back out of the mold through the sprue. The nature and origin of these gases are matters of chemistry and of metallurgy and cannot be fully considered here. It is claimed that among them have been found nitrogen, hydrogen, sulphurous gas, and oxygen. By deduction the author inclines to the belief that oxygen is the chief offender. Gasified metal and oxidized metal originate in a simular manner and, in part, respond to a similar cure. This seems to point to an identical agent of offence. Melting practice is chiefly responsible for gaseous metal and includes details such as "soaking" the metal, leaving it unprotected, overheating it, and pouring at too high a temperature. Almost any copper alloy that is poured extremely hot will show the gaseous effect. When the casting demands extremely hot metal, the author invariably adds a small quota of zinc or a trace of phosphorus, or both, to reduce the possibility of oxidation and gas. It is indicated by experience that further causes of gas in metal are newly lined and damp furnaces and pouring ladies, and accidental contaminations with metal that is not intended in the melt.

### DRY CORES AND THEIR VENTING

The dry core is a body of bonded sand functioning in some need or some position of the mold where green sand would be impractical, unsafe or impossible. Primarily, the dry core is used in a mold under the following conditions: First, where the part is such that green sand cannot cope with the metal action; second, where the part is so located or formed that the pattern cannot integrally include it for green sand; third, where the use of a dry core will greatly facilitate and cheapen molding costs as compared to the use of green sand.

**This series will be continued in an early issue.—Ed.**

# Drawing and Stripping Silver Plated Copper Wire

## A Discussion of the Methods and Lubricants Used in These Operations

Q.—In the drawing down of silver-plated copper wire, we have trouble, now and then, with the silver coming off the wire as it is being drawn through a diamond die. We keep the wire greased with bees-wax to prevent this, but it does not do away with it entirely. Would this be due to the plating or the method of keeping the wire greased?

We would also like your opinion on a practical and economical method of salvaging silver on silver-plated copper wire.

A. (1)—We presume your trouble is caused in silver plating the copper wire. Silver is just as ductile as copper and the elongation is almost identical. Your difficulty would indicate, then, that the silver is not adherent and flakes off in the final wire drawing operation or operations. By increasing the free cyanide content of the silver plating solution, you will no doubt obtain a more adherent silver deposit. If you do not succeed in doing so by the addition of 1 oz. sodium cyanide, or more, per gallon of solution, it would be advisable to run the copper wire through a cyanide of mercury dip first. The dip is prepared as follows:

| | |
|---|---|
| Water | 1 gallon |
| Sodium cyanide | 6 ozs. |
| Mercuric oxide | ¼ oz. |

Remove the excess before the wire passes into the silver solution by passing through two layers of felt or jute.

The simplest method to remove silver from copper wire would be to form a silver sulphide on the wire with polysulphide of sodium, in hot aqueous solution. Then reduce the silver sulphide with a solution of sodium cyanide and deposit the silver out metallically upon steel cathodes. The cathodes could afterwards be used as anodes in resilver plating the wire.—CHARLES H. PROCTOR.

A. (2)—Viewing your first problem from a distance and without the advantage of being able to follow through, we would say you can discard the idea that the damage is due to the drawing operation. While beeswax does not rank high as a lubricant for this purpose, we assume you have adopted it in order to meet some special condition.

In any event, mechanical defects run pretty constant, but we note you state that this trouble occurs "now and then," which would point to the silver plating problem. A careful inspection of the wire where the silver has come off should show this. It is hard to tell just what the trouble with the plating is, so many factors enter into it. One of the causes of peeling where a cyanide solution is used (you do not say what kind of solution you use) is the relation between the cyanide content and the current density. If the solution contains too much cyanide or the current density is too strong, the plate will not adhere firmly to the copper wire. For the control of the cyanide a reliable test would be to see if the copper will become coated with silver without the aid of electricity.

Another point to watch is the thickening of the solution owing to the accumulation of salts that have no direct bearing on the plating. The process is full of subtleties and can only be controlled by the operator.

There are standard ways to strip silvered articles, but these are not adapted to the handling of small quantities. One way to do this would be to immerse the silver coated wire in a mixture of equal parts of fuming sulphuric acid and nitric acid. The acid will dissolve the silver and as long as no water is introduced in the mixture, the copper will not dissolve. The mixture should be kept closed to prevent the acids from absorbing moisture from the air.

To recover the silver from the solution, dilute the mixture with, say, ¼ its volume of water, and add hydrochloric acid (muriatic acid). Keep adding acid until no more precipitate is formed. The silver has in this way been precipitated as silver chloride. This precipitate can be filtered and washed and used as pure silver chloride to make up more fresh solutions. But if it is desired to have it as metallic silver, the precipitate is melted in a crucible with calcined soda and charcoal. Another process, though much slower, would be to dissolve the silver on the wire with potassium or sodium cyanide by leaving the wire in a tank of cyanide. The copper will be attacked, too, but could be controlled by not leaving the bare wire too long after the silver has been dissolved. The silver from the solution can be recovered by precipitating it with zinc dust or zinc shavings. The zinc throws down the copper that is in the solution together with the silver, but the precipitate consisting of silver, zinc and copper can be melted to a button, and cupelled. Another way: The precipitate can be dissolved in a mixture of sulphuric and nitric acids and the silver precipitated in the form of silver chloride by adding hydrochloric acid, or common salt to the mixture in which the silver and the copper and zinc precipitate has been dissolved. This second precipitate, silver chloride, is filtered and fused in a crucible with soda ash and charcoal, recovering pure silver, or the silver chloride can be used to make fresh solutions for the plating tanks. —WILLIAM J. PETTIS.

---

Q.—In reply to our question in regard to lubricants used for drawing fine silver plated copper wire, you stated that bees-wax, which we use, does not rank high as a lubricant for this purpose. We would like to know what the best lubricants are for drawing wire and the methods used to apply them.

If there are any late books or papers devoted to wire drawing, we would be pleased if you could send us the names of the publications and the addresses of the publishers.

A. (1).—Two parts beeswax and one part yellow rosin melted together might result in a better lubricant. The removal of the silver deposit from the copper wire is not caused by the lubricating factor; either the silver is non-adherent at times or there is insufficient silver deposited upon the copper wire to withstand the final drawing operation through the diamond dies. A more perfect control of the silver plating solution is necessary, both chemically and electrically, to produce a uniform deposit of silver that will be adherent and of sufficiently uniform thickness to withstand the final drawing operation.

It is customary to silver plate copper wire, dead soft, at 18 or 20 B. & S. gauge, then draw it down continuously to the required thickness. The silver should be 1% of the weight of the wire, e.g., wire 99 lbs., silver deposited 1 lb.—CHARLES H. PROCTOR.

A. (2)—Various soap powders are used generally and on many machines. The type known as the straight roll wire drawing machine uses a liquid composed of Colgate soap and water, through which the wire runs.

For literature on the subject, "Wire and Wire Products," published at Washington, N. J., covers this ground quite thoroughly. Manufacturers of wire mill machinery have considerable information on this subject; it is given to patrons or prospects.—WILLIAM J. PETTIS.

# The Growth of Industrial Cleaning

## The History, Chemistry and Mechanics of Metal Cleaners—Conclusion*

By D. J. BENOLIEL,
International Chemical Company, Philadelphia, Pa.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

While on the classification of cleaners it may be well to sketch here the difference between caustic potash and caustic soda and to show just why the former is so superior to the latter.

It is a well-known chemical fact that the combination of an alkali, whether potash or soda, with saponifiable oil or grease (vegetable or animal) will produce a soap. This process is called "saponification" and is what takes place, to a greater or less extent, in every cleaning solution. However, mineral oils cannot be saponified but must be "emulsified"—a physical action. By far the vast majority of work is cleaned by the combination of these two processes—saponification and emulsification.

On both saponification and emulsification, caustic potash and its salts prove much more effective and economical than caustic soda and its compounds. Here are the reasons:

1. **Potash is much more soluble than soda.**

"107 parts of KOH dissolves in 100 parts $H_2O$ at 15° C"

(Page 716, "Dictionary of Chemical Solubilities" by A. M. Comey, published by MacMillan Company, New York).

"46.36 parts of NaOH dissolves in 100 parts of $H_2O$ at 15° C"

(Page 851, "Dictionary of Chemical Solubilities" by A. M. Comey, published by MacMillan Company, New York.

2. **Potash will saponify much more rapidly than** soda.

"Caustic potash is preferable to caustic soda since potash soaps are more readily soluble than soda soaps. The more intimate contact of the reacting masses thus helps to bring saponification more rapidly to an end. . . ."

(Page 105, Volume 1, "Chemical Technology of Oils, Fats, and Waxes" by J. Lewkowitch. Published by MacMillan & Company, London).

3. **Potash salts are more powerful emulsifiers than** the corresponding soda salts.

4. **The potash soap produced in the cleaning solution is a far better emulsifier than a soda soap.**

"It can readily be realized that practically the best soap should consist of sodium (or better potassium) salts of fatty acids. . . ."

(Page 39, Section No. 1, "The Modern Soap and Detergent Industry" by Geoffrey Martin, published by Crosby Lockwood & Son, London).

5. **Potash produces a "soft" soap which is much** more **soluble than a soda or "hard" soap.** As a result the following advantages accrue:

A. The more soluble soap dissolves more quickly and therefore allows the cleaning solution to eat more rapidly through the layer of grease.

B. As the potash is so very soluble it insures a rapidly obtained, freely rinsed surface.

"It must be remembered, however, that the solubility of soaps in water is a factor, which affects their lathering and cleansing powers. Many soaps which otherwise are suitable for laundry work possess the defect of being sparingly soluble in water."

"1 part of sodium cleate (soda soap) is soluble in 10 parts of water."

"1 part of potassium cleate (potash soap) is soluble in 4 parts of water."

(Table of Solubilities foot of page 43, "Technical Handbook of Oils, Fats, and Waxes" by Fryer and Weston, published by University Press, Cambridge, England.)

"Caustic potash is preferable to caustic soda since potash soaps are more readily soluble than soda soaps."

From the above it can be seen just how and why potash cleans more effectively than soda. Now for an explanation of its economy.

If potash cleans three or four times as rapidly as soda, then one can put three or four times as much work through the same tank during the same period of time. That is one way to look at the proposition. If we follow this line of reasoning a little further, we can easily see that if one pound of potash is used instead of three or four pounds of soda we will obtain the same speed in cleaning as with soda, with the resulting economy and freely rinsed work.

Herein lies the statement that "one pound of potash will do the work of three or four pounds of soda." All agree that most of a cleaning solution is lost by being actually carried from the tank on cleaned work. Therefore, if a two-ounce solution of potash will give the same speed as a six or eight ounce solution of soda, only two ounces of cleaning material will be lost when a gallon of solution is removed on cleansed work. Hence the great economy of potash.

"The amount of potash required to clean is only about ¼ the amount of caustic soda formerly used." (Statement from Independent Engineering Report made by A. C. Nielsen Company on a large Hardware manufacturing company).

"We have used First Sorts Potash in our plant for some time, and we find it is very much superior to soda and ordinary compound cleaners for cleaning metal products." (Statement by production head of a large electrical corporation).

In metal cleaning the subject of soaps alone is a very intricate and interesting one. Frankly they are really the only satisfactory materials yet found that efficiently and economically remove those troublesome buffing dirts from oxidizable metals. We are assuming that gasoline and similar materials are out of the question due to price and danger. Many concerns have tried to clean buffing dirt with alkali cleaners with rather poor results unless they employ cleaners of the third class with the electric current. Many buffing compositions have as a binder a saponifiable material such as stearic acid. When this combines with soda the hardest of hard soaps is formed

* Part 1 was published in our issue of January, 1928.

and the dirt is glued firmly on the work in combination with a difficult rinsing soap. A special soap emulsifies the binder and thus loosens the dirt which can easily be removed by mechanical means, such as agitation in the cleaning solution.

So much for the technology of the chemicals. Next we shall speak of the mechanical end of industrial cleaning—the methods by which the work is handled and the correct application of the various chemicals. This will round out the entire subject.

For the technician who is interested in further scientific references going into further detail on the above statements relative to the use of potash, the following publications are suggested.

"Chemical Technology & Analysis of Oils, Fats, & Waxes"—Lewkowitch.

"Seifenfabrikation"—C. Deite (Berlin).

"Transactions Amer. Chemical Sec. 1914 195957"—T. W. McBain, N. E. Martin.

"Chem. Zeitschrift 1911, 1027"—Shufeff and Schestakoff.

"Chemical Solubilities" J—Comey (Comparison of KOH and NaOH).

### APPLICATION OF INDUSTRIAL CLEANSERS

Much mechanical ingenuity has been applied to the use of modern cleaning compounds to give the very best results. Most metal cleaning today, as formerly, is done in tanks, either still or electrically connected. The other chief cleaning methods are: washing machines, tumbling barrels, automatic tanks, steam sprays, air sprays, and mechanical brushing.

### TANKS

Let us take up the question of tanks. The kind of work that can be handled to advantage varies according to plant conditions, equipment, etc. They are almost always used where work should be made chemically clean just prior to electroplating. They are also used to a great extent in the rough cleaning of machined parts before inspections, stocking, or assembling; in the cleaning of metal work prior to painting, enamelling, lacquering, or japanning; for cleaning repair parts in automotive service stations and railroad shops; for stripping japan; for removing burnt-on oils; and for practically every other cleaning job where the piece is of such a size that it can be handled to advantage in a tank.

Cleaning tanks should be made of steel, iron, or wood and should be heated by means of steam coils, live steam, or gas pipes, preferably placed on the side of the tank from which the work is to be removed. One should always have this heat on the working side of the tank because this sets up convection currents, which keeps the accumulated grease and dirt away from the side of the tank from which the work is removed. For the general run of cleaning the solution should be kept boiling. However, whenever handling oxidizable metals, lower temperatures are preferable in order to prevent undue tarnishing.

After the work is taken from the cleaning tank, it should, in almost every case, be rinsed in clear hot water. This final rinse effectively knocks off any accumulated grease, dirt, and oil which has not been entirely washed off in the cleaning tank.

When the electric current is used in cleaning metals, one gets the advantage of mechanical cleaning as well as chemical cleaning. This mechanical cleaning is caused by the evolution of gas on the work, these gas bubbles actually forcing off the particles of grease which are then attacked by the emulsifying and saponifying action of the chemical cleaner in the solution. In this manner the cleaning takes place in a most rapid and economical way.

To get the best results, the work to be cleaned should be hung on the negative bus bar of the dynamo. This is ordinarily termed the cathode in the cleaning tank. On this cathode hydrogen gas is being evolved. The reason for so hanging the work is evident when one considers that there is twice as great a volume of hydrogen in a molecule of water, $H_2O$, as there is of oxygen. In this manner when water is electrolized, one gets twice the volume of gas at the cathode that one would get at the anode. Inasmuch as it is this nascent gas that gives the cleaning action, it can easily be seen that the greater amount of gas at the cathode gives much better cleaning results. In addition hydrogen is a reducing agent whereas oxygen would oxidize the softer metals.

In the operation of an electric cleaner, 10 to 12 volts will give the best results. However, the voltage must be increased in accordance with the load of metal put in the cleaning tank, inasmuch as the cleaning depends on the current density. The reason it is necessary to raise the voltage is because the decrease in resistance is not quite proportional to the increased area of metal in the tank, and therefore, a higher voltage is required to produce the same current density. As far as the correct current density is concerned, this should be sufficiently great to cause copious evolution of gas on the work. Of course, it is impossible to use alternating current. Direct current is the only kind that can give results.

Sometimes it is preferable to use a double throw switch in cleaning electrically. Inasmuch as an electric cleaning tank is rigged up in exactly the same manner as an electro plating tank, frequently foreign metals in the cleaning tank are plated on to the metals being cleaned. When a double throw switch is used, the current can be reversed for a couple of seconds after the work is cleaned. This reversed current will tend to throw off any foreign metals from the surface. Then the current should be thrown back for a moment before removing the work from the tank.

### WASHING MACHINES

Washing machines are a comparatively recent development in the field of metal cleaning, and there are several excellent types upon the market. All these machines fall into two distinct classes:—

1. Those that throw the cleaning solution upon the work by means of paddles.
2. Those that impinge the cleaning solution on the work by means of sprays and nozzles.

All machines have tanks in the lower section which contains the cleaning solution. The paddle type throws this solution from the sides on to the work whereas the spray type pumps the solution from the tank either through fixed nozzles or rotating nozzles or rotating sprays placed above, below or on the sides of the work.

For continuous cleaning it is invariably necessary to have a so-called "conveyor type" of washing machine. There are three types of conveyors:—

1. An automatic bar conveyor whereby large pieces or baskets can be carried through the machine on the endless chain.
2. A wire mesh bar conveyor whereby pieces can be thrown directly on the wire mesh and carried through the machine on the endless chain.
3. The rotary, perforated drum conveyor whereby small parts can be carried through the machine by the rotary motion.

The conveyor goes through the washing machine so that the work can be put in at one end and removed at

the other end thoroughly clean. The most advanced types of washing machines consist of three units.

1. A washing unit containing the chemical cleaning solution.
2. A rinsing unit containing merely clear hot water.
3. A drying unit.

The conveyor carries the work from the beginning of the first unit to the end of the third unit so that it is now possible to put the dirtiest kind of work on a conveyor at one end of a complete washing machine and to remove it at the other end completely clean and dry ready for the next operation.

These washing machines are admirably suited for the cleaning of machine parts (rough and heavy duty cleaning), sheet metal parts to be japanned or plated, work to be lacquered, screw machine products, and similar work. They are not suited for handling jobs that require a great deal of time such as stripping japan and paint.

### TUMBLING BARRELS

Tumbling barrels are practically a necessity where one has to contend with small work such as bolts, nuts, rivets, staples, hooks and eyes, grommets, rings, pins, and similar types. It would be quite difficult to handle these in perforated baskets in a tank, but the tumbler takes care of the situation ideally. Of course, in the tumbling process mechanical as well as chemical cleaning is brought into play, but another important point is that the rubbing of the pieces against one another actually tends to polish them. The tumbler is really a godsend to work with rough edges or burrs for it smooths the metal as it is being cleansed.

### SPRAY SYSTEMS

Much work has been recently done on the application of the principle of atomization to the manipulation of cleaning solutions. This spray system is excellent for cleaning large machinery, automobiles, railway cars, locomotives, and similar large jobs; although it is also applied in many factories for cleaning floors and small work.

The common method is to heat a container full of cleaning solution and to atomize this directly upon the work with a spray gun. This method works admirably except where it is necessary to strip paint or handle very difficult jobs. Often on these difficult jobs it is necessary to use a strong cleaner, and the fumes from the spray are often objectionable. On this type of work the "flow on" process is used. In this system the container holding the solution is placed on a level above the work to be cleaned. The heated solution is then flowed by gravity over the surface, and after it has been allowed to soak for a while the entire surface is attacked with a steam spray, which finishes up the job.

In many shops steam is not available, and here air sprays have given good results. The solution is heated by a gas burner and then sprayed by means of compressed air. Of course, the spray system gives the advantage of adaptability, mobility, and mechanical force of the steam or air.

### CHOOSING THE CLEANING COMPOUND

Many men experienced in the metal trades, frequently ask "What is the best cleaner on the market?" The question is ridiculous for, as outlined above, a compound that will give ideal results one place will fail miserably in another. The correct cleaner to use depends upon:

(a) The metal to be cleaned.
(b) The substance to be removed.
(c) The subsequent operation through which the work is to be put.
(d) The method of handling.
(e) The personal preference of the operator as to the type of compound.
(f) Whether speed or cost of solution is paramount.
(g) A number of other plant conditions.

Only when a really qualified expert has studied all the above points can the really ideal cleaner be placed in the plant. The trouble today is that there are really few men qualified to analyze conditions and still fewer concerns in a position to furnish just the correct cleaner for each individual operation. A number of concerns have succeeded in putting cleaning compounds into the patent medicine class and, unfortunately, many plant managers and purchasing agents have come to look upon cleaner men as patent medicine peddlers. The sooner this impression is removed, the better it will be for all.

There are many factors to be considered in choosing the best cleaner for a job. Of course, results should come first; that goes without saying. By results one means that the metal surface should be cleaned absolutely correctly for its next operation. It should be chemically clean for plating or japanning, or cleaned without tarnishing for lacquering, or cleaned without the possibility of rusting for stocking, and so on. Next, time is a very important item in most cases. Then comes cost of solution, not only in first making it up, but in its upkeep over a production period, in other words, "the life of the cleaner." And one must not forget to reckon the labor cost in operation, for if extra wiping, scrubbing, or dipping is necessary, the compound becomes very expensive no matter what its original cost. After the above factors have been determined, then, and only then, can one look at the price per pound. One should look closely here for many a cleaning compound costing 12c. is doing fine work in a plant where an 8c. cleaner would give just as good and efficient results. The bulk of metal work should not require high priced cleaners.

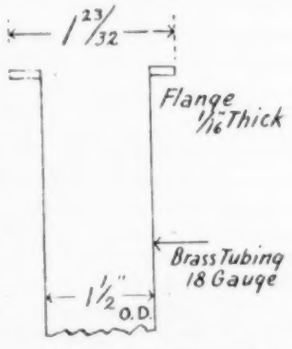
As stated before, the way to insure maximum cleaning results at minimum cost is to invite a trained cleaning expert from a qualified concern, which manufactures a complete line of fairly priced cleaners, to view conditions at first hand. This representative should enter the plant as a physician and frankly and fully discuss each problem with the production man, taking into consideration every possible factor.

Then by virtue of his experience and the advice of the technical department he should personally install the proper cleaning materials that give just the results desired on each particular job. If each problem in the plant is studied carefully in this manner, cleaning troubles would be kept at the minimum, and costs held down to bed-rock.

## Rapid Brazing

Q.—We wish to inquire through your research department, if it is possible to braze an 18 gauge brass collar to a 12 gauge brass stud in any other way than gas brazing. We require a quick, simple method that can be worked in quantity production.

A.—Try the dip method process same as followed in the bicycle trade. A quick and fast method is sweating with soft solder if practical. See sketch for making same from one piece. I make ferrules or tail pieces as per sketch in thousand lots. Use two rollers for swedging.—P. W. Blair.




ONE PIECE FERRULE

# The Walrus and Metal Finishing

## What It Is, Where It Is Found, and the Part It Plays in Our Industrial Life

By JAMES J. MANDERSCHEID,
President Advance Wheel Manufacturing Company, Inc., Chicago, Ill.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

The walrus, morse, or sea-horse as it is sometimes called is a large marine mammal allied to the seals, but representing a family by itself. The English term "walrus" is a corruption of the Scandinavian "valross" or "valros," meaning "whale-horse," and from this we probably get the term sea-horse.

A full grown walrus measures as much as 16 feet from head to tail, and is an exceedingly heavy and clumsy animal, very massive about the shoulders. The animal weighs well over 1 ton when fully grown, and measures 9 to 12 feet round the chest. The head is rounded, and the muzzle short and broad, covered with stiff bristly whiskers. The eyes are small, and the animal has no visible ears. Instead of terminating in a snout, the nostrils of the Walrus are situated high above the mouth, on what seems to be the middle of the face.

The surface of the skin is covered with short, stiff hair, very patchy, and varying in color from light yellowish brown to dark chestnut. The skin itself is very thick, especially on the shoulders, where it has been measured over 2¼ in., and it hangs here in deep and heavy folds.

The most striking feature of the walrus is its pair of heavy, ivory tusks which protrude downwards from the upper jaw. These are curved slightly inwards, and measure about 23 in., though about 6 in. of this is hidden in the skull. The ivory of the tusks is inferior to that of the elephant and is not of much commercial value. They are used chiefly as icehooks, and are used by the walrus to lift itself out of the water on to the ice. The walrus also makes use of them to dig its food out of the sand on the sea bottom, and they are its only weapon of defence.

THE WALRUS

### WHERE THE WALRUS IS FOUND

The walrus is found in herds, sometimes over a hundred in number, in the northern circumpolar regions, living as far north as explorers have penetrated. But on the Atlantic coast of America they were found in the 16th century as far south as Nova Scotia, while in the last century they were common in the Gulf of St. Lawrence and off the coast of Labrador.

Several years ago the walrus was found in large numbers off the coast of Spitsbergen, but owing to the large number of whalers which were sent to capture it in that vicinity, it has been driven away to the north coast of Siberia and the Kara Sea, and in the west to Hudson's Bay, Davies Straits and Greenland, where it is fairly plentiful at the present time.

Another species of walrus (Odobaenus Obesus) has been found on the North Pacific Coast, in the Bering Straits, Kamchatka, Alaska, and the Pribylof Islands. This walrus is even larger than the Atlantic species, with a hide which is much heavier on the shoulder and very wrinkled. The head is also different in shape, while the tusks of the Pacific walrus are longer and slenderer.

### COMMERCIAL VALUE

The commercial products of the walrus are its oil, hide and ivory. Its flesh is the chief article of food for the Eskimo and Chukchi, the latter tribe depending mainly on the walrus for its support.

The most valuable part of the walrus is undoubtedly its hide, which is used extensively in industry today.

### AFTER CAPTURE

When the walrus is captured the first operation necessary is the flaying, or taking off the skin. The skin of the larger animals is generally cut down the back, and taken off in two pieces.

Considerable skill is required in the flaying to avoid damaging the skins, and the ultimate value of the skin is largely determined by the care taken in this process. After the hide has been taken off it is salted to keep it from rotting and remains in the salted state until it reaches the tannery. In order to remove the thin outer skin and short stiff hair, the skins are lightly limed and left in this state for a short period, after which they are put into the tanning liquor. The tanning process is very long, especially in the case of the thickest hides, some of these taking as long as 2 years before they are thoroughly tanned. They are then brought out of the tan yards into the drying sheds, and either hung or preferably laid flat on racks in a moderate temperature, and very slowly dried. It is extremely important that the drying process should not be rushed, as this would result in the hides becoming "burnt" or brittle, and of little commercial value. When the hides are thoroughly dried they are graded according to thickness and are ready for the market.

### VALUE OF WALRUS HIDE IN THE POLISHING ROOM

Few people realize the tremendous value that this little

known material has. For all kinds of polishing, such as is done by jewelers, silverware manufacturers, electroplaters, and, in fact, all manufacturers of metal articles which require a high surface, this leather is superior to anything known.

All grades of emery are used in connection with this leather according to the finish which is required, and it is definitely known that there is no material equal to walrus hide for helping to produce that high degree of workmanship which is so noticeable on our finer qualities of metal products.

WALRUS POLISHING WHEEL MANUFACTURE

Very little is known about the manufacture of walrus polishing wheels by the average polisher and for that reason the writer wishes to point out a few facts regarding the manufacture of this most important polishing wheel which is being used more and more every year.

Walrus leather come in hides varying from ½ in. to 1½ in. and sometimes 1¾ in. in thickness with a surface on them which is very uneven, wrinkled and out of shape. Because of this condition walrus wheel manufacturing is a rather difficult task.

A true running walrus polishing wheel is not merely made by cutting out a circular disc from the hide and then bored with a hole. If a polisher were to use a walrus wheel made in such a way he would have a very difficult time trying to hold the piece of work to be polished against the face of this wheel without tiring himself. One method of manufacturing walrus polishing wheels by which they can be made so that they can be used without tiring effect, is to cut a walrus hide in discs of the desired dimensions. These discs are treated with a solution to make them flexible, which, by the way, practically brings them back to their original softness prior to their being tanned. After they have been immersed into this particular solution for a time, they are taken out and are placed under a pressure of approximately 2,000 pounds and left under such pressure until they are partly dry and until they have attained a flat surface.

After coming from the press they are placed directly over heat to thoroughly dry and remove any moisture that may still be in them from the soaking process. We now have thoroughly dried flat walrus discs. They are now ready to be bored with the required arbor hole after which they are placed on a trimming machine. In order to get a true running wheel it is placed on a spindle of the same size on which it will be used. This is very important. in this way, and at a speed of approximately 3,000 R.P.M. it is trimmed to the proper shape. To the layman it would seem that this would be all that is necessary to do to make this a true running walrus polishing wheel. On the contrary it does not yet run as true as it should and for that reason the wheels are again placed on a machine that trims off the sides or high spots. This operation trims the wheel on both sides so that it has the same thickness at the face over the entire circumference of the wheel.

PECULIAR CONSTRUCTION OF WALRUS LEATHER

The reader can get a very good idea of the strength of walrus leather by looking through a magnifying glass which is placed directly over the face of the walrus wheel before it is set up in emery or other abrasive. He will notice how the fibres of this leather mesh with one another. These fibres are rather difficult to pull apart and for that reason the face of a walrus wheel will hold in its meshes such polishing mediums as tripoli, emery, crocus, pumice stone, etc., far better than any other polishing wheel known to the industry.

# Plating Conference at Washington

An important conference on electroplating was held at the Bureau of Standards, Washington, D. C., on March 2, 1928, just as this issue was about to go to press. While a longer report will have to be deferred until the next issue, it can be stated here that there was a good attendance of electroplaters and chemists, including some members of the American Electroplaters' Society and some representatives of firms subscribing to the Research Fund of the Society. The recommendations that were made at the conference are to receive the consideration of the Bureau of Standards and the Research Committee, and future activities are to be announced soon.

Those who were at the conference enjoyed an inspection trip through the Bureau's electroplating laboratories as well as through the laboratories in the Industrial Building at Washington. Dr. William Blum was in charge of the conference, at the opening of which he made some interesting remarks at the morning session. A resume of published researches was presented, including the following:

Polarization and Throwing Power; Nickel Plating; Zinc Plating; Chromium Plating; Electrotyping.

The following reports on researches in progress were made:

Spotting Out, by W. P. Barrows; Composition and Analysis of Cyanides, by M. R. Thompson; Overvoltage, by H. E. Haring; Iron Deposition, by C. T. Thomas; Addition Agents in Copper Electrotyping Solutions, by R. O. Hull.

In the afternoon there was a session at the Industrial Building, R. J. O'Connor president. Here there was given a report from the Research Committee of the American Electroplaters' Society, which was followed by general discussion of plating subjects, including chromium, nickel, cyanide copper and brass plating.

## White Silver Strike on Steel

Q.—Please give me a formula for producing a white silver strike on steel. I prefer one without copper, and which will permit burnishing.

A.—The following strike solution gives good results:

| | |
|---|---|
| Water | 1 gallon |
| Silver cyanide | ⅓ oz. |
| Caustic potash | ½ oz. |

Use anodes of 75% copper and 25% silver, with supplementary anodes of rolled hard nickel or hard tool steel—CHARLES H. PROCTOR.

## To Study Time Saving

The Time Study Engineering Standardization Committee of the Chicago Chapter of the Society of Industrial Engineers, is investigating existing plans and systems in order to arrive at a standardized procedure applicable to all industries. The primary objectives of the committee are to compile data which will meet the requirements of an industrial text book.

This reference work is to emphasize the importance of an understanding of correct theory, practice and procedure, and to correlate time study engineering with the many activities and functions of industrial management. —Monthly News Bulletin of the Commercial Standards Group, Bureau of Standards, Washington, D. C.

# Meeting of the New York Platers

## A Report of the Annual Banquet and Educational Session Held at the Aldine Club, New York City, February 18, 1928

The Nineteenth Annual Banquet of the New York Branch of the American Electroplaters' Society which was held at the Aldine Club, New York City, on February 18, 1928, was a complete success, the attendance exceeding all expectations and the affair running with a smoothness and precision for which the Banquet Committee is to be highly congratulated. While attendance had been limited to 500, the arrangements had been so skillfully managed that an excess over this number was easily cared for and no confusion was felt. The music as well as the dinner provided were both very fine, and expressions of satisfaction were heard on all sides. Large delegations were present from a number of the other branches of the Society, the largest being from Newark, Philadelphia and Bridgeport. The banquet was enlivened by singing in which everybody present joined, and by the distribution of souvenirs and favors. A drawing was held in which several persons won fine prizes.

### EDUCATIONAL SESSION

The educational session, held in the afternoon, preceding the banquet, was also a preeminently successful function, attracting a large number of members and guests and providing a program of papers which might well serve as a model for technical organization.

The session was presided over by Charles H. Proctor, Founder of the American Electroplaters' Society, who introduced each speaker and also contributed some interesting remarks of a technical nature.

The following technical papers were presented:

**Electrode Reactions and Surface Films in Electroplating,** by C. L. Mantell, Ph.D., consulting chemical engineer, Pratt Institute, Brooklyn, N. Y. All plating solutions are similar in that they all have low metallic ion concentration, although they are produced in several manners, such as by use of salts, acids, etc. Chromium, for instance, has an extremely low concentration and in chromium plating, the hydrogen film at the anode must be regulated for the successful completion of the operation. All reactions at the anode are simple. Many metals tend to depolarize the hydroxyl ion. It has been determined that metals which tend to alloy easily, will have good adherence when used in a plating solution.

Commenting on this paper, Mr. Proctor stated that there are many factors besides hydrogen which affect the adhesion of chromium to nickel. He mentioned some new advances in chromium plating, especially a German process that has been brought out. (The Bosse Process, developed in Germany, was outlined in an article in the January, 1928, issue of THE METAL INDUSTRY, by Dr. W. Pfanhauser.) Mr. Proctor made mention of the use of a chloride chromium solution which has been used successfully in this country.

A. K. Graham, research chemist, Hanson-Van Winkle-Munning Company, New York, presented a paper on **Polarization** in which he discussed the various phases of polarization in electroplating baths and the effects of this upon the process of plating. Outlining a circuit of 6 volts which runs from the generator through the bath and back to the generator, Mr. Graham explained the progressive loss of current and stated that the polarization value is equal to the excess voltage needed to maintain a steady flow of current at a given voltage. The various causes of polarization are: speed of ions; current density; ion discharge; agitation; temperature; chemical polarization. Overvoltage seriously affects polarization, and electroplaters must understand polarization if they are to proceed properly. In discussion it was pointed out that polarization is rapidly becoming a highly important factor in the technology of electroplating, and that while platers at present are but slightly acquainted with it, they will be compelled to learn it. In evidence of this, a member of the Philadelphia Branch and also one from the Newark Branch stated that polarization had been given some attention by their educational classes.

F. V. Knauss, president of the Portsmouth Stove and Range Company, Portsmouth, Ohio, delivered an extemporaneous address on the Madsen process of depositing nickel. He declared that this process has made it possible to roll or draw metals after nickel plating with much finer results than has heretofore been possible.

In a paper on **Jobbing,** Justus A. Stremel, past chairman of the New York Branch, outlined the organization, arrangement and methods of a practical job plating plant. Mr. Stremel is to be congratulated upon the highly intelligent manner in which he presented his data, which should prove to be an important contribution to the literature of electroplating. The paper dealt in the most graphic and direct terms with the problems and procedure of management of a jobbing plant. He discussed the variety of work done in such a plant, the arrangement of the plant for the most efficient and economical performance of such work, the layout of the plant for the various operations. He made a chart of a typical good-sized jobbing plant in which he had the following divisions: Gilding and Bronzing, Polishing, Burnishing, Jewelry and Coloring, Silver and Nickel, Dipping and Lacquering. He discussed the work of these departments and made some extremely acute observations with regard to jobbing practice. He concluded his talk with a word on management, outlining the duties of the office and the practical management, covering the duties of the foreman and the estimating department. The paper was vociferously applauded and commendations were expressed by many in the audience.

George B. Hogaboom, of the Hanson-Van Winkle-Munning Company, New York, speaking at the session, declared that the plater must have an objective in order to make progress. "It is necessary for us to have always something we do not yet fully understand, so that in striving to grasp it, we may keep going forward. Polarization and other phenomena are at present technological phases of electroplating which the average plater understands but slightly. But it will not be long before every man in the industry will have a good working knowledge of these things. I am glad that this is so, but I am more happy that there is still something ahead of us to learn, for it is this that keeps us active."

The session was adjourned by Mr. Proctor, who stated that it had been one of the best he had ever attended, a view that was expressed by many others present. He added that he hoped there would be many more such sessions, and he urged that more time be given to them, suggesting also that practical demonstration of new phases of electroplating technology would be of great value.

# THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

Member of Audit Bureau of Circulations and The Associated Business Papers

Published Monthly—Copyright 1928 by THE METAL INDUSTRY PUBLISHING COMPANY

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE, United States and Canada $1.00 Per Year. Other Countries $2.00 Per Year. SINGLE COPIES, 10 CENTS
Please Remit by Check or Money Order; Cash Should Be Registered

ADVERTISING RATES ON APPLICATION. FORMS CLOSE THE FIRST OF THE MONTH

Palmer H. Langdon .....Editor and Publisher
Adolph Bregman .....Managing Editor
Thomas A. Trumbour.....Business Manager
Evan J. Robinson .....Advertising Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
Telephone Number: Beekman 0404. Cable Address: Metalustry

Vol. 26 New York, March, 1928 No. 3

## Contents

Annual Meeting of the Institute of Metals Division ..... 107
A Report of the Sessions Held in New York, February 21-24, 1928.

Pewter for Rolling and Spinning..... 112
By W. J. REARDON

Standardization Progress..... 112

Mummy Preserved by Copper..... 113

The Development of the Aluminum Industry 114
The Growth from a Laboratory Curiosity to a Great Industry.
By ALUMINUM MAN

Electric Smelting Advancement ..... 116
Recent Developments in the Induction Furnace and the Progress It Has Brought About in the Melting of Metals—Conclusion.
By G. H. CLAMER

Removing Lead from Babbitt..... 117

The Fundamentals of Brass Foundry Practice 118
A Description of the Basic Laws Which Control the Melting and Casting of Metals and Their Application to Practical Foundry Operations—Part 15.
By R. R. CLARKE

Drawing and Stripping Silver-Plated Copper Wire ..... 120
A Discussion of the Methods and Lubricants Used in These Operations.
By WILLIAM J. PETTIS

The Growth of Industrial Cleaning..... 121
The History, Chemistry and Mechanics of Metal Cleaners—Conclusion.
By D. J. BENOLIEL

Rapid Brazing ..... 123
By P. W. BLAIR

The Walrus and Metal Finishing ..... 124
By JAMES J. MANDERSCHEID

Plating Conference at Washington ..... 125

White Silver Strike on Steel..... 125
By CHARLES H. PROCTOR

To Study Time Saving..... 125

Meeting of the New York Platers..... 126
A Report of the Annual Banquet and Educational Session, Held at the Aldine Club, New York City, February 18, 1928.

Editorials ..... 128
Institute of Metals Division Meeting.
Platers' Meetings.
The Building Industry.
Price Cutting.
The Prince Takes Up Jewelry.
Walter L. Abate.

Correspondence and Discussion ..... 130

New Books ..... 130

Technical Papers ..... 130

Government Publications ..... 130

Shop Problems ..... 131

Patents ..... 133

Equipment ..... 134
Physical Properties of Adnic.
Ball Bearing Grinder.
Pickling Solution Addition Agent.
New Automatic Grinder.
Chromic Compound Rack Covering.
New Scratch Brush Sections.
Horizontal Disc Grinder.
New Red Protective Paint.
Industrial Ovens.
Spray Gun for Heavy Fluids.
New Combination Grinder.
New Hard Aluminum Alloy.
Universal Tool Post Grinder.

Equipment and Supply Catalogs ..... 137

Associations and Societies ..... 137

Personals ..... 139

Obituaries ..... 140

News of the Industry ..... 141

Metal Market Review ..... 149
By R. J. HOUSTON

Metal Prices ..... 151

Supply Prices ..... 152

THE METAL INDUSTRY is regularly indexed in the Industrial Arts Index

Edition this Month, 6,000 Copies. Buyer's Guide—Advertising Page 83.

# Editorial

## Institute of Metals Division Meeting

A complete report of the annual meeting of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers appears on page 107 of this issue. This meeting was the last to be held under the auspices of the administration headed by Dr. Merica as Chairman of the Division, with Mr. Skowronski as Chairman of the Papers Committee. It is in order to say at this time that it marked the completion of two of the most successful years in the history of the Division.

The program included sessions on lead, metallography, secondary metals, light alloys, copper and precious metals. Unlike previous meetings, a good proportion of the week was devoted to the work of the man in the plant. A symposium on secondary metals attracted a large and deeply interested audience. The discussions were enthusiastic and it was particularly noteworthy that after the adjournment of the meeting the members remained in the room for over an hour, divided into numerous small groups in which discussions had sprung up spontaneously. Such evidence is unmistakable.

Two questions of special interest seemed to stand out. One was sampling, the methods involved and the difficulty of obtaining correct samples by the buyers and sellers of scrap. The other was the old question of whether it paid the producer of scrap materials to refine them himself or to sell them to the smelter. The discussion of these two questions was particularly enlightening.

Interesting papers were presented by C. E. Swartz on Lead-Tin-Cadmium Alloys; T. A. Wright on the Sampling and Evaluating of Secondary Non-Ferrous Metals; M. G. Corson on Manganese in Non-Ferrous Alloys; Price, Grant and Phillips on the Alpha Phase Boundary of the Copper-Nickel Tin System; Wichers, Gilchrist and Swanger on the Purification of Six Platinum Metals.

The annual lecture by Dr. Mathewson on Twinning in Metals was a scholarly description of a new theory of the mechanism of plastic deformation.

The Institute of Metals Division is the official technical organization of non-ferrous metallurgists, most of whom are engaged in physical, chemical and metallographic testing of metals. Its line of least resistance would lead it to obtain papers only from laboratory men and to spread out along lines of abstract research rather than operating methods. The administration of the Institute has been such, however, as to keep it from becoming too narrow. It has definitely reached out for the practical man, the operating works manager, superintendent and even foreman. The two sessions described above are definite proof of the intention of the Division to cover every corner of its field and to prevent itself from becoming an esoteric body of "highbrows."

Congratulations and the hearty thanks of the members are due to the outgoing administration of the Division. The incoming officers should have a brilliant period ahead of them, headed as they are by Mr. Skowronski, who has made such a fine record as chairman of the Papers Committee, and Mr. Tour, who has had long experience in committee work, as the new chairman of that committee.

## Platers' Meetings

The annual banquet and open session of the New York Branch of the American Electroplaters' Society, held on February 18, 1928, exemplified the change in the meetings of the American Electroplaters' Society and the progress of this Society. An account of this meeting appears on page 126 of this issue. A good proportion of the papers presented were on abstract phases of electroplating, such as Electrode Reactions and Surface Films in Electroplating, by Dr. Mantell, Polarization, by A. K. Graham, and others. These were among the subjects discussed before a group of platers who a few years ago were said to be unable to understand the elements of chemistry. They were called "rule-of-thumb men" who would never take any interest in the basic scientific facts of their industry!

The discussions which followed these papers and the interest which the audience took in the application of these abstract questions to their daily work proved that the plater is no longer satisfied to remain in the dark. The average plater is not yet an electrochemist, but he is unquestionably acquiring an understanding of electrochemistry and electrometallurgy. He may never be able to do abstract research in pure science, nor is it likely that he will ever need to do so. He is, however, able to read intelligently the work of scientists and to apply their results to his own work of producing plated articles of the best possible type under the conditions as they exist.

At one time there was warm discussion between those who felt that platers would be pushed out by chemists and others who believed that chemists would fail in practical manufacturing operations. The trend of the times seems to have proved both sides wrong. Chemists are gaining a knowledge of practical plating operations and platers are acquiring an understanding of chemistry.

All of which is as it should be.

## The Building Industry

Everyone is watching the building situation in the United States. For that reason any statistics or even predictions from reliable sources are read eagerly, particularly by the metal trades, whose prosperity depends to such a great extent on the health of the building trades.

The Copper and Brass Research Association has estimated the total value of buildings in the United States at over $180,000,000,000. They estimate also that construction in 1928 will total almost $10,000,000,000, including new buildings, and repairs and maintenance of existing structures. Expenditures in 1927 on the same basis were about $9,775,000,000.

Total new construction in 1927 was about $5,725,000,000, a little less than for 1926, but more than the amount estimated by various authorities early in 1927. Of this total, dwellings took over $3,000,000,000. Commercial buildings were responsible for the expenditure of over $900,000,000. Industrial buildings cost something under $400,000,000; schools about $400,000,000; recreational buildings about $300,000,000; hospitals, hotels, public buildings and religious institutions made up the balance.

To the total of $5,725,000,000 for new buildings is added $4,049,000,000 for repairs and maintenance, making the grand total of $9,775,000,000 quoted above.

Estimates of expenditures for 1928 are interesting. Dwellings should take about $2,400,000,000 and other construction about $2,600,000,000, totalling about $5,000,000,-

000. Fire and storm losses should call for replacements of about $600,000,000. Repair and maintenance should call for about $4,000,000,000.

The geographical distribution is estimated: New York and New Jersey, 26 per cent; Michigan, Indiana, Illinois, Wisconsin, Iowa, Missouri, Nebraska and Kansas, 24 per cent; Southern States, 11 per cent; South Central States, 21 per cent; New England, 6½ per cent; Pacific Coast, 6½ per cent; South West about 4 per cent; and the rest over a scattered territory.

The net conclusion of these estimates seems to be that building for the coming year will be slightly less in volume than for the past, but the drop will not be so much as to cause a serious disturbance. The trend, however, is evident. The building industry is no longer booming. It is not fading away, but the bonanza days are over.

## Price Cutting

These are the days when the getting of an order hinges to a great extent on the price quoted. It is still a buyers' market. Competition is keen and often bitter. The price structure is falling and the whole tendency is to "make it cheap."

Here and there brave souls keep their backbones stiff, but the facts are that even large and powerful organizations are known to be working under the principles that it is better to make no profit, or even to take a slight loss, than to have the wheels idle.

Both are definitely and unquestionably wrong. It may seem advantageous for the individual at certain times, but for the industry as a whole it is ruinous. Business cannot be continued at a loss, as everyone knows. As a method of competition, taking accounts away from others is unfair and uneconomic. In such a struggle no one wins—not even the customer.

Orders taken below cost are likely to be skimped. It is almost impossible to give the same high quality of materials and workmanship to an order which it is known will show a deficit. Only on business decently priced and showing a fair margin of profit can the attention and materials be put in to keep the products up to the high standards which should be required by every market. On underpriced purchases the seller loses money and the buyer risks unsatisfactory materials and the loss of reputation with his market. The public risks buying defective products. Everyone loses.

It takes courage in times like these to stand one's ground. It calls for fortitude to refuse business and lose an opportunity to "fill up the plant." But this courage pays. It pays the individual who maintains a reputation for probity and dependability. It pays the industry because it maintains a reasonable standard. It pays the public because it insures quality.

The buyer who forces excessive price-cutting by bringing undue pressure to bear injures not only his suppliers but his own house. The sooner this is realized the better for everyone. The seller who submits to dealings of this kind is equally to blame. He is weak.

A number of remedies has been suggested to better these conditions, such as open bidding, the posting of those bids when the job is let, a demand that buyers should show concrete evidence of lower bids when asking for cuts in prices, co-operative cost keeping and cost finding organizations in various trades, and a host of other plans. The form of the remedy does not matter. Mechanical devices may aid, but the important thing is the attitude of the people involved.

Only three things need be remembered:

1. Be absolutely certain of your costs.
2. Refuse to sell at figures below these costs.
3. Refuse to buy from anyone who quotes prices below what you know to be his costs.

A much happier day will dawn in American industry when these three rules are adhered to.

## The Prince Takes Up Jewelry

At a recent dinner of the Birmingham (England) Jewelers' and Silversmiths' Association, the Prince of Wales was the chief speaker. His Royal Highness has the difficult job of being the chief speaker at a great many affairs dealing with matters with which he cannot possibly be familiar. The job of being a Prince seems to be enough to keep him more than fully occupied and unquestionably allows him no time to become an expert in various industrial and technical specialties. Consequently the Prince's speech was cheerful and friendly and, while it was on the subject of jewelry, it was more of a handshake than an address.

Nevertheless, he displayed an interestingly clear view of the jewelry trade. Stating, as he did, that the trade was subject to the whims and changes of fashion, he was unquestionably right. He was right also when he said that there would always be a demand for jewelry. Whether or not ornamentation came before dress is an open question. Certainly, however, dress has never been without ornamentation and never will be. Jewelry will continue to be the leading method of personal adornment. In the United States the medium and cheaper grade jewelry business, using semi-precious stones or no stones at all, has grown to great proportions. This industry suffers, just as the British jewelry industry does, from changes of fashion, new ideas in novelties and the whims of the consuming public—largely feminine. But as an industry, it is here to stay and grow. Its growth depends upon the prosperity of the country, as in bad times luxuries are the first to be curtailed. But the advent of prosperity (which always does come back) brings back the hunger for beautiful things and the industry feasts which supplies them.

Probably the most needed factor in the jewelry trade is improvement in design in cheap jewelry. It costs no more for things to be beautiful than for them to be ugly. The market is beset with thousands of unaesthetic novelties and items of jewelry. Presumably they are bought or they would not continue to be made. Whom to blame it is hard to say. Whether the mass of the public demands these atrocious designs, forcing manufacturers to supply them, or whether the public can find nothing else to buy at the price, has never been thrashed out. The fact is, however, that among the things sadly lacking in jewelry are low and medium priced products of real beauty. It is our impression that such items would be as a great stimulus to trade as any other single factor.

## Walter L. Abate

It is with deep regret and a sense of great personal loss that THE METAL INDUSTRY reports in this issue the death of one of its associate editors, Walter L. Abate, brass finishing expert. Mr. Abate spent nearly half a century in the brass industry, starting as an apprentice in the same shop and at the same time as Henry Ford, with whom he was well acquainted as a boy. Mr. Abate, too, was a pioneer in the automobile industry, having done considerable work on the brass parts in the days when the automobile was under development.

For ourselves and for the brass industry in general, we take this opportunity of expressing our sincerest sympathy for Mrs. Adda Abate and her two sons.

# Correspondence and Discussion

**Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.**

## Antique Bronze on Steel

To the Editor of THE METAL INDUSTRY:

Thank you for the information you submitted concerning a dipping process for antique bronze finish on steel. This data will be of great value to our customer in his efforts to secure the results desired.

THE HARSHAW FULLER & GOODWIN COMPANY
By J. E. BARTLEY

Cleveland, Ohio,
December 30, 1927.

## Acid Brass and Bronze

To the Editor of THE METAL INDUSTRY:

In your Shop Problem No. 3711, issue of January, 1928, it is not made clear whether a dip or a plating solution for acid brass and bronze is desired. I would suggest the following dip:

| | |
|---|---|
| Water | 3¾ gals. |
| Sulphate of copper | 1½ to 1¾ lbs. |
| Sulphuric acid | 1 qt. |
| Flake tin | 2 lbs. |

The tin should be melted and dropped into water to flake, then added to the dip. Bright steel or iron can be brass-colored by the same process as bright copper dipping. Nails, screws, tacks, etc., can be basket dipped. Work should not be left in the solution to turn dark.

ANDREW V. RE.

Coldwater, Mich.,
January 19, 1928.

## Inquiry Brings Results

To the Editor of THE METAL INDUSTRY:

We have your answer to our recent technical inquiry, for which we wish to thank you very much. Mr. Turner, the superintendent of our Metal Department, is very much pleased at the satisfactory results he is now obtaining.

Yours truly,
THE FAIRPOINT CORPORATION.
By H. L. BLISS.

New Bedford, Mass.,
January 11, 1928.

# New Books

**Commerce Year Book, 1926. Vol. II—Foreign Countries.** Published by Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C. 642 pages, 10 maps, 68 charts. Price $1.25.

This volume is a sequel to a similar work, Vol. I, which covered the trade and industry of the United States. Together, the two volumes constitute a complete picture of the industrial and commercial activities of the world during 1926. The new book includes economic reviews of every foreign country, each of which is accompanied by discussions on such subjects as Production, Transportation, Labor, Prices, Finance, Foreign Trade. There are analyses of the trade of each country, with separate compilations of their trade with the United States. Comparative world statistics covering areas and populations, agriculture, manufactures, transportation, communication and finance are very intelligently and concisely outlined. The book should be of exceptional value to those interested in the import and export trade.

**Postponing Strikes.** By B. M. Selekman. Published by the Russell Sage Foundation of New York. Size 5½ x 8, 405 pages. Price $2.50.

This book, one of a series published by the Russell Sage Foundation on various problems in industry, is a study of the Canadian industrial disputes act and the effect which it has had on the stability of industry in Canada.

To the investigator it seems that "if Canadian experience may be taken as a guide for the United States, it clearly demonstrates the futility of compulsion as compared with conferences and negotiations under Government auspices between representatives of management and men." In other words, free negotiations without compulsion gives best results.

**Transactions of the American Foundrymen's Association. Vol. XXXV.** Edited by Robert E. Kennedy. Published by the American Foundrymen's Association, 140 S. Dearborn St., Chicago, Ill. Size 6 x 9, 484 pages.

# Technical Papers

**The Use of Lead in Sulphuric Acid Manufacture.** By A. E. Marshall. A paper presented at the meeting of the American Institute of Chemical Engineers, St. Louis, Mo., December 5-8, 1927.

This paper gives in brief the history and development of the use of lead for the chambers and chamber linings in the manufacture of sulphuric acid.

**Characteristics of Very Pure and Commercial Lead.** By George O. Hiers. A paper presented at the meeting of the American Institute of Chemical Engineers, St. Louis, Mo., December 5-8, 1927.

This paper describes the physical and chemical characteristics of several actions of lead, such as electrolytic, corroding lead, chemical lead, common lead (desilverized) and common lead (undesilverized).

**The Use of Lead in Engineering Practice.** By Owen B. Ellis. A paper presented at the meeting of the American Institute of Chemical Engineers, St. Louis, Mo., December 5-8, 1927.

This paper describes the alloys, properties and practical applications of lead in industry.

**The Effect of Temperature on the Properties of Metals.** American Society for Testing Materials, Philadelphia, Pa.

This is a progress report of the Joint Research Committee on the Effect of Temperature on the Properties of Metals to the American Society of Mechanical Engineers, and the American Society for Testing Materials.

The Committee has been working with a number of testing laboratories on various steels, nickel-chromium alloy and pure nickel. The future program will be to make the following tests.

1. Tension tests, short and long time.
2. Chemical stability.
3. Tension tests of non-ferrous metals.
4. Physical and thermal constants.
5. Other mechanical tests, for example, fatigue, impact, torsion, etc.

## Government Publications

**Rare Metals.** By Frank L. Hess, Bureau of Mines, Washington, D. C. Covers cobalt, molybdenum, nickel, tantalum, tungsten, radium, uranium and vanadium.

# Shop Problems

**This Department Will Answer Questions Relating to Shop Practice.**

ASSOCIATE EDITORS { JESSE L. JONES, Metallurgical; WILLIAM J. PETTIS, Rolling Mill; W. J. REARDON, Foundry; P. W. BLAIR, Mechanical; CHARLES H. PROCTOR, Plating Chemical

## Black Finish on Steel

Q.—Will you please let us know how to put a black finish on low-priced sheet steel articles? We desire a smooth or a mottled finish in the quickest and cheapest way possible.

A.—Since you mention two different effects you want to get, you must decide which to use. The smooth black finish and the mottled blue finish such as seen on gun parts and automobile wrenches are both obtained in a similar manner, but the materials used are entirely different. Procedure is as follows:

BLACK FINISH

Steel articles must be free from grease and surface oxidation, and as bright as possible; this can readily be assured by barrel tumbling. Secure a steel or iron pot or kettle of suitable dimensions and arrange to heat it up to 800° F. with gas, coke or coal. Materials to be used in procuring black finish are:

| | |
|---|---|
| Sodium Nitrate | 1 lb. |
| Black oxide of manganese | 1 oz. |

Heat as many pounds of the above mixture in the iron pot as may be found desirable to give you sufficient output. Immerse cleansed steel articles in the molten mixture, using either wires or an iron wire mesh basket, until articles become a gun metal blue color. Remove and quickly cool in water; then dry out by the aid of boiling water and sawdust. To give protection and lustre to the finish, the articles may afterwards be tumbled for a few minutes in a hardwood sawdust moistened with a very little linseed or similar heavy oil.

MOTTLED BLUE FINISH

The operations are somewhat similar to those given in the data for the black finish. However, for the mottled blue finish, 30% cyanide mixture must be used for the molten bath. The heat must be increased to 1200° F. The articles must be cleansed as outlined above, then immersed in the molten cyanide mixture at a temperature of 1200° F. to 1250° F. until they become a cherry red. Then remove the articles and hold in the air for a moment after which quench in cold water. The water must be agitated by compressed air from a lead pipe which should be arranged so that the air comes from the bottom of the receptacle. The more energetic the bubbling of the water due to the air pressure, the better the mottled blue finish will be. After the finish is produced, wash, dry and oil as directed above.

All articles must be perfectly dry before immersing in either molten mixture. It is advisable to preheat to 400° F. or more before immersing the articles in the mixtures. For quantity production on the black finish an automatic gas furnace could be used, one such as manufactured by the American Gas Furnace Company, Elizabethport, N. J. Mottled blues cannot be satisfactorily produced by mechanical methods.—C. H. P. Problem 3,731.

## Cadmium on Wrenches

Q.—How can I cadmium plate wrenches?

A.—We assume that you are familiar with the other lines of plating, such as nickel, copper, etc. Cadmium plating is no different than cyanide copper plating. The solution, once prepared, requires only the addition of water and one-eighth to one-fourth ounce of sodium cyanide 96-98 per cent, per gallon of solution each day it is operated to maintain the original solution line. The cleansing of the steel parts must be identical to that done in nickel plating. The following solution will give splendid results:

| | |
|---|---|
| Water | 1 gallon |
| Sodium cyanide, 96-98% | 7 ozs. |
| Cadmium oxide | 3 ozs. |
| Caustic potash | 2 ozs. |
| Black molasses | 1 oz. |

Temperature, 100° to 110° Fahr., at 5 to 6 volts.

To prepare the solution, dissolve the sodium cyanide and cadmium oxide in one-third the total amount of water at 160° F. When dissolved, add one-third more of the water; then the other materials in the order given above, and finally the balance of the water. The solution is then ready for operation. The anodes should consist of pure cadmium. The anode surface as compared with the sork surface to be plated should consist of 70% as cadmium anodes and 30% hard steel, the size to approximate the cadmium anodes. To retain the clear white cadmium deposit after plating, care must be exercised in drying the articles. Cold water rinsing and air pressure drying are most satisfactory.

Cadmium plating processes have been developed by the following concerns, with whom it might be advisable for you to get in touch: Roessler & Hasslacher Chemical Company, 709 Sixth Avenue, New York; Udylite Process Company, 3220 Bellevue Avenue, Detroit, Mich.; The Grasselli Chemical Company, Guardian Building, Cleveland, O.—C. H. P. Problem 3,732.

## Cadmium Solution

Q.—Please tell me how to mix a 150 gallon solution of cadmium. Also outline a method of plating, giving current and anodes to be used.

A.—A very fine cadmium plating solution is made of the following:

| | |
|---|---|
| Water | 1 gallon |
| Sodium cyanide, 96-98% | 7 ozs. |
| Cadmium oxide | 3 ozs. |
| Caustic potash | 2 ozs. |
| Black molasses | 1 oz. |

For a method of plating with this solution, refer to our Problem 3,676, answered in the issue of September, 1927, on page 387.—C. H. P. Problem 3,733.

## Chromium on Auto Radiators

Q.—We would like to know a method for preparing a buffed nickel plated surface on a product such as an automobile radiator shell for chromium plating. Can you tell us, also, the best manner in which to prepare steel and brass for nickel plating in order to produce a plate that will not blister when chromium plate is applied over the nickel?

A.—Several automobile manufacturers who chromium plate steel radiator shells proceed as follows:—The shells are polished as usual and finished with Tampico or bristle brush wheels and flour emery paste, after which they are cleansed with alkaline cleaners and thoroughly water washed. They are then flashed for five minutes in a hot nickel plating solution high in nickel chloride, at 110° F. They are then washed in water and plated direct in a hot copper cyanide solution for at least 20 minutes, after which they are washed, dried and color buffed to a good lustre. Then they are recleansed. Next, they are nickel plated in the same type of solution or a bright nickel solution; if the latter is not used, they are buffed to a lustre. After buffing,

the nickel plated surface is chromium plated without recleansing in the alkali cleaner, but all dirt resulting from buffing is removed by wiping with soft cloths. If articles to be chromium plated are dry before immersing in the solution, better results are obtainable. A four-minute deposit at 125 amperes per square foot of surface will give a sufficient coating. Some platers start with 10 volts which is reduced to 6. The method outlined should give good results and prevent blistering and eliminate blistered deposits.—C. H. P. Problem 3,734.

## Chromium Solution

Q.—Please let me know how to make up a 150 gallon solution for chromium plating. I also want to know what current and what sort of anodes to use.

A.—One of the latest chromium solutions is as follows:

| | |
|---|---|
| Water | 1 gallon |
| Chromic acid | 30 to 60 ozs. |
| Chromate of iron | 1 to 2 ozs. |
| Ammonium oxalate | 1 to 2 ozs. |

For a method to use this solution, see our answer to Problem 3,715, in The Metal Industry, January, 1928, pages 40 and 41—C. H. P. Problem 3,735.

## Hard Spots in Cast Brass

Q.—We are having difficulty in making clean yellow brass castings for ornamental use. The castings look alright when sent out of the foundry, but when buffed by the polisher show small hard spots which cannot be eradicated even by grinding down into the casting. After being silver-plated they are left overnight and nearly always show signs of spewing the next day. The small spots still show through the plating. The metal is melted in crucibles with oil fuel and poured around 2300° F. The formula is 70 copper, 27 zinc, 2 tin, and 1 lead. We are wondering if the spots are formed by copper scale which leaves the copper when it is being melted. Heavy unburnt copper wire is used. The castings are molded in San Diego sand. Could the trouble be sharp sand particles which have fallen out of the cores mixed with the molding sand? Can you suggest a solution to overcome the above troubles? Maybe a good flux or a different sand would help.

A.—We are at a loss to advise you just what your trouble is. If you would send us a small sample of the work, we could advise more definitely. We wonder if you are adding aluminum to your metal. If so, this would cause such a difficulty as you are having. We do not think your trouble is due to copper. It may be sand. However, from the description you give we rather think you are adding aluminum to your alloy or that it gets in somehow. Aluminum can be added in small quantities if the gating is arranged so that the metal will enter the mold quietly, without foaming. If you are using aluminum as a flux to aid the running of the castings we suggest you try silicon copper instead. Use five ounces to one hundred pounds of metal and eliminate the lead in the alloy mixture. However, these are only suggestions. If you send a sample we will advise you more definitely.—W. J. R. Problem 3,736.

## High Conductivity Cast Copper

Q.—We have been asked to make several shapes of copper castings, mostly chunky pieces running up to six or seven pounds each, for electrical work. The castings have to stand oil pressure and therefore must be sound, and the consumer says that the electrical conductivity must be the highest possible. He wants a conductivity as high as refined bar copper, which we do not believe he will ever get in a sand casting. We can get fairly sound castings either with phosphor copper or boron carbide, provided the heat is obtained, but the conductivity is affected badly. In your opinion, is it possible to get a sound copper casting of high conductivity? What method can you suggest to help us produce copper castings such as these?

A.—It is possible to get high conductivity in cast copper; that is, 90% conductivity, which is all that should be required from a sand casting taking copper at 100% conductivity in the ingot. What is required, is to melt the metal under a cover, get it good and hot, and add 3 ounces of 10% silicon copper. Use large risers on the casting and open sand. Skin dry the mold. Use a binder in the molding sand to stand the drying. This is not absolutely necessary but makes a cleaner casting. Better still, cast the copper in an iron mold or place a chill in the sand mold. It will aid you in getting a sound casting, which is necessary to secure high conductivity. A sound copper casting with as little deoxidizer as possible. This class of castings is made every day under similar conditions.—W. J. R. Problem 3,737.

## Rustproof Black Finish

Q.—Our plating plant has been used chiefly for tumbled steel articles taking a nickel finish which is afterward reburnished in castile soap and steel balls. We are now starting to manufacture a stamped steel product that requires a black metallic finish, preferably rust-resisting, which can be applied directly after stamping without a polishing operation, and over which a coating of paint may be applied. We can copper plate, oxidize, and lacquer, but this might not meet the requirements. We have a copper solution of your formula. It is alkaline, used hot. We have not employed it of late. Will you kindly suggest a process for this product? We should also like to know the cause of blistering in copper plate produced with the solution mentioned above. We use a 4-volt generator, with a fairly heavy load. Is it possible that the voltage is insufficient? What recent book on electroplating do you suggest?

A.—If you desire to obtain a rustproof surface on the steel articles before applying the coating of paint, a copper oxidized deposit will help to some extent, but automobile manufacturers are now producing rustproof black rims, and the process given below is replacing the zinc plate previously used as standard. The rustproof surface is produced as follows:

1. The articles should be cleansed as usual with hot alkaline cleaners.

2. They should then be zinc plated in any standard zinc solution.

3. After zinc plating, wash thoroughly in water and then immerse in the following solution:

| | |
|---|---|
| Water, 120° F. | 1 gallon |
| Caustic soda | 3½ ozs. |
| White antimony oxide | ½ oz. |

4. The zinc will turn black immediately. Articles should then be removed, washed and dried, then painted or enamelled as desired. Maximum rust-resisting qualities should thus be obtained.

Blistering of copper plate usually results from having the free cyanide content in the solution too low; the direct cause being occluded hydrogen in the deposit. We would suggest the addition of 1 oz. of sodium bisulphite per gallon of solution, after which 1 oz. of sodium cyanide per gallon may be added. These additions should overcome the blistering. If not, add further small amounts of sodium cyanide until blistering is eliminated.

We would suggest that you get a copy of "Electro-Plating and Electro-Forming," by Blum and Hogaboom. This is the latest work and should prove of value to you.—C. H. P. Problem 3,738.

## Time Required for Plating

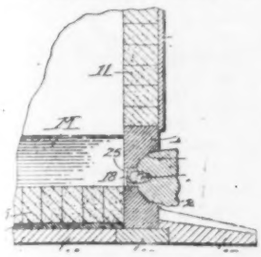
Q.—Is there such a thing as a chart or table giving the time requirements for plating? I should like to have data showing the time required for the deposition of a given thickness of metal on a given amount of surface, with a certain amperage. I am interested in copper and nickel solutions.

A.—We can refer you to three articles of a series entitled "Metal Plating," by W. G. Knox, which appeared in THE METAL INDUSTRY some years ago. The series consisted of a compilation of tables showing the time required to deposit a given thickness of metal; there were also certain remarks of a general nature. The tables on nickel plating appeared in the first article, on page 269, issue of June, 1919. For copper there were two articles, each containing tables. These appeared on page 15, issue of January, 1920, and on page 168, issue of April, 1920.—C. H. P. Problem 3,739.

# Patents

## A REVIEW OF CURRENT PATENTS OF INTEREST

1,651,278. November 29, 1927. **Process of Producing Corrosion-Resisting Coating on Iron and Steel and Products.** Chad H. Humphries, Kokomo, Ind., assignor, by mesne assignments, to Metals Protection Corporation, Indianapolis, Ind. Process of protecting iron and steel articles against corrosion which comprises applying to the surfaces thereof an overcoating of chromium or an under-coating of copper.



1,651,445. December 6, 1927. **Tapping Plug for Metallurgical Furnaces.** Daniel Cushing, Cambridge, Mass.

A tapping plug for a metallurgical furnace comprising an outer portion of plastic and non-combustible material, and an inner portion of carbonizable material.

1,651,694. December 6, 1927. **Rustproofing.** Matthew Green, Detroit, Elmer M. Jones, Adrian, and Hobart H. Willard, Ann Arbor, Mich., assignors to Parker Rust-Proof Company, Detroit, Mich.

The process of making a rust-proofing compound, comprising dissolving a metal of the electro-motive series from manganese to iron, inclusive, in a solution of phosphoric acid and forming a di-hydrogen ortho-phosphate of said metal, crystallizing the phosphate, and removing the crystals from the mother liquor.

1,651,709. December 6, 1927. **Solder.** Jesse L. Jones, Edgewood Park, Pa., assignor to Westinghouse Electric & Manufacturing Company, a Corporation of Pennsylvania.

A brazing solder which consists of an alloy of substantially 6 to 10% phosphorus and the remainder copper.

1,651,886. December 6, 1927. **Lead Product and Process of Producing the Same.** James O. Handy, Pittsburgh, Pa., assignor to Primos Company, a Corporation of Delaware.

The herein described process of separating lead values from storage battery waste which comprises mechanically dislodging and separating the brittle parts from the non-brittle, treating the dislodged material with a solution of an alkali metal carbonate without the application of heat separating the residue from the resulting mixture and then roasting the residue.

1,651,970. December 6, 1927. **Corrosion-Resisting Alloy.** Peirce D. Schenck, Dayton, Ohio, assignor to The Duriron Company, Inc., a Corporation of New York.

A corrosion resisting alloy comprising about 89 per cent of copper, 7 per cent of aluminum, 3 per cent of iron, and one per cent of nickel.

1,652,077. December, 1927. **Lithium-Containing Bearing Metals.** Georg Welter, Frankfort-on-the-Main, Germany, assignor, by mesne assignments, to Allied Process Corporation, New York.

Bearing-metal alloys consisting essentially of lead and comprising lithium in quantity sufficient to produce an appreciable hardening effect but not in excess of about 0.1% and an appreciable amount of at least one other alkali metal not substantially in excess of about 1.0%.

1,652,078. December 6, 1927. **Lead-Alkali Metal Containing Bearing-Metal Alloys.** Georg Welter, Frankfort-on-the-Main, Germany, assignor, by mesne assignments, to Allied Process Corporation, New York.

Bearing-metal alloys consisting essentially of lead and comprising lithium in quantity sufficient to produce an appreciable hardening effect but not in excess of about 0.05% and an appreciable amount of at least one other alkali metal not substantially in excess of about 0.5%.

1,652,301. December 13, 1927. **Acid or Sea-Water Resisting Alloy.** Thomas M. Diven, Sr., Baltimore, Md.

Articles having the appearance of aluminum and great resistance against the action of acid, salt water or salt water spray, said articles being made from an aluminum alloy containing approximately 5.25% tin, .75% of phosphorus and above 93% aluminum.

1,652,740. December 13, 1927. **White-Gold Solder.** Thomas P. Shields, New York, N. Y., assignor to Shields & Moore, New York.

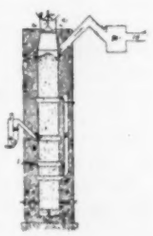
An alloy suitable as a white gold solder, consisting essentially of the following: gold, 40 to 82%, together with nickel, zinc and silver in proportions of nickel, about 4 to 10 parts; zinc, about 8 to 20 parts; silver, about 10 to 25 parts.

1,652,931. December 13, 1927. **Cleaning and Polishing Compound.** Leo M. De Mars, Minneapolis, Minn.

A cleaning and polishing compound consisting of approximately one gallon of carbon tetra-chloride and approximately four pounds of Vienna lime.

1,652,184. December 13, 1927. **Process and Apparatus for Extracting Zinc.** John Skogmark, New York, N. Y., assignor of one-half to March F. Chase.

The process of extracting zinc from zinc bearing materials which consists in maintaining in a shaft furnace a suitable charge of zinc bearing material and carbonaceous fuel, applying an air blast near the bottom of such charge, by-passing from a lower zone to an upper zone a part of the gaseous products of combustion formed in the lower zone, thereby preheating the portion of the charge in the upper zone, and withdrawing from a zone in the shaft itself intermediate the ends of the by-pass gases containing zinc vapor.



16,826. December 20, 1927. **Recuperative Furnace.** Charles Stein, Paris, France, assignor to Societe Ch. M. Stein & Cie., Paris, France. A vertical furnace of the class described, comprising a hearth, means for admitting and burning therein a combustible mixture of air and gas, means for exhausting the products of combustion therefrom, a recuperator through which the incoming air passes and through which the outgoing products of combustion pass for heating said air, and a smoke collector for the final exhausting of the products of combustion provided with means for regulating said exhaust.

1,653,008. December 20, 1927. **Nitrocellulose Lacquer and Process of Making Same.** Irvin W. Humphrey, Kenvil, N. J., assignor to Hercules Powder Company, Wilmington, Del. A nitrocellulose lacquer comprising a solution of nitrocellulose, camphor and crude fenchone and diluent liquids, one of which comprises pine oil constituents and another of which comprises a liquid of a substantially lower boiling range than that of camphor and fenchone.

1,653,010. December 20, 1927. **Nitrocellulose Lacquer.** Irvin W. Humphrey, Wharton, N. J., assignor to Hercules Powder Company, Wilmington, Del. A nitrocellulose lacquer including a solution of nitrocellulose containing from about one per cent to twenty per cent of dehydrated and oxidized pine oil.

1,653,088. December 20, 1927. **Composition of Matter.** Tomas de la Concha, New York, N. Y., assignor of one-half to Percy A. Hughes, London, England. A composition of matter comprising lead, tin, zinc, aluminum and German silver in approximately the following proportions: 30% lead, 50% tin, 12% zinc, 5% aluminum and 3% German silver.

1,653,215. December 20, 1927. **Apparatus for Heat-Treating Metals.** Frederic S. Kochendorfer, River Forest, and Arthur E. Schulz, Chicago, Ill., assignors to Western Electric Company, Incorporated, New York. In a heat treating apparatus for metals in strand form, a heating chamber, mechanism for feeding the strand through the heating chamber, friction driving means for said mechanism, and a brake device operated by the strand for controlling the effect of said driving mechanism.

1,653,255. December 20, 1927. **Method of Tinning Articles.** Charles A. Comp, Detroit, Mich., assignor to Buhl Stamping Company, Detroit, Mich. The method of tinning articles comprising the immersing of the article in a bath of molten tin, removing the same from the bath, mounting said article rigidly, and immediately spinning the article to remove excess tin while shielding the same from air currents set up by the said spinning.

# Equipment

## NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

## Physical Properties of Adnic*

**A Discussion of the Article on Adnic Which Appeared in The Metal Industry for January, 1928, Pages 43-44**

To the Editor:

It is desired to call attention to Fig. 1 of Mr. Price's paper on "Physical Properties of Adnic" which appeared in the November number of Mining and Metallurgy, page 474 and THE METAL INDUSTRY for January, 1928, page 43. This figure is stated by Mr. Price to show "comparative figures for Admiralty nickel and Monel metal, compiled from tests determined by the U. S. Bureau of Standards." This is in error as the results for Monel metal were not made at the Bureau of Standards.

The results on Admiralty nickel were obtained in the Bureau's laboratories during the year 1924. At that time, objections were made in correspondence with Mr. Price to comparison of test results on two different alloys tested, with different equipment and methods, in two different laboratories on the basis that misleading conclusions were liable to be drawn. Such comparisons are made in Mr. Price's Fig. 1.

Recent work of the Joint Research Committee of the American Society of Mechanical Engineers and the American Society for Testing Materials on Effect of Temperature on the Properties of Metals, shows frequent and wide variations in the numerical results obtained on the same metals at different laboratories and tends to substantiate the objections raised in 1924.

Mr. Price has not given full details of the test methods and equipment employed in the two sets of tests. It is therefore difficult to determine whether the results on the two alloys are on a comparable basis.

It is felt that the data given in Fig. 1 do not establish the superiority of either one of the two alloys from the standpoint of mechanical properties at elevated temperatures.

Washington, D. C., Nov. 29, 1927. GEORGE K. BURGESS.

---

To the Editor:

Since the article by W. B. Price, in the November issue of Mining and Metallurgy, p. 474 and THE METAL INDUSTRY for January, 1928, page 43, on the physical properties of adnic, contains some not exactly well founded data and tends to give a distorted picture, I beg to be permitted to make the following criticism.

Adnic is merely a variation of the usual 30 per cent cupro-nickel. Aitchison in his book on "Engineering Non-ferrous Metals and Alloys," published in 1923, states that an introduction of tin in the amount of 1 to 5 per cent into regular cupro-nickel serves to increase enormously the resistance of the latter to corrosion. However, Aitchison does not give any proofs to this statement. Mr. Price, who sponsored Adnic in America, did not give figures on the comparative corrosion resistance of the two alloys. Again, neither Price nor anybody else even so much as tried to show that Adnic, with its 1 per cent tin, is better or easier to make than an alloy with 2, 3, 4 or 5 per cent tin. If tin actually gives an increased resistance to corrosion, why should this influence cease or become stationary after the limit of 1 per cent tin is passed? In short, I do not see what particular properties and features permit to foster the use of Adnic or of Ambrac, another alloy of this kind, in preference to the plain well-known and rather moderately corrosion resistant 30 per cent cupro-nickel.

As far as the data contained in the article go I wish to say:

1. There can be no difference of 2,300,000 lb. in the modulus of elasticity of Ambrac and Adnic respectively.

2. The physical properties of a 1-in. hot-rolled hexagonal rod are not the physical properties of the metal. They depend too much on the incidental temperature of the last few passes and on the speed of rolling. In the annealed state the elongation of Adnic is higher than 46 per cent and the tensile strength is lower than 64,000 lb.

3. Graphs which show the comparative change in tensile strength and other mechanical properties of Monel and Adnic are definitely misleading. This is due to the fact that Monel metal has been tested in the annealed state (or nearly annealed) while the samples of Adnic have been taken in the hard state, but not sufficiently hard to anneal at the lowest point. As a consequence some additional strength due to cold work counterbalanced the softening action of the temperature upon the samples of Adnic while the samples of Monel metal did not have this advantage.

Also the graphs of plasticity which show such a strong drop between 400° and 750° C. are rather queer. Should they be corroborated by a large number of tests it would mean that the nature of Adnic is far more intricate and much more interesting from the viewpoint of theoretical metallurgy than from that of industrial uses.

New York, Nov. 22, 1927. M. G. CORSON.

---

To the Editor:

I have read with considerable interest Mr. Corson's criticism of my article on the "Physical Properties of Adnic." Mr. Corson makes the statement that Adnic is merely a variation of the usual 30 per cent cupro-nickel and that I do not figure on the comparative corrosion resistance of Adnic and 30 per cent cupro-nickel.

In view of the fact that the article in question dealt primarily with the physical properties of Adnic, as such, it is obvious that the question of corrosion data does not enter into the case at all.

Mr. Corson's reference ot Aitchison's book seems misleading, for, to the best of our knowledge, the use of tin is recommended only in a 50-50 cupro-nickel base alloy (page 237) and not at all in regular 30 per cent cupro-nickel. If 5 per cent tin were introduced into a 70-30 cupro-nickel the metal as cast would contain a secondary constituent, making it unfit for cold working without a prolonged homogenizing anneal. In the case of a 50-50 base alloy, considerably more tin can be held in solid solution and castings with even 7 per cent tin do not ordinarily show a secondary constituent as cast.

The addition of 1 per cent tin to 30 per cent cupro-nickel not only increases the resistance of the latter to corrosion, but also imparts other valuable properties. We have numerous laboratory tests as well as industrial appliances in every day use which substantiate the above statement, but which as a matter of company policy cannot be published at the present time.

Again, the statement is made that "Price nor anyone else even so much as tried to show that Adnic with its 1 per cent tin is better or easier to make than an alloy with 2, 3, 4 or 5 per cent tin." An alloy with a higher percentage of tin would be neither practical nor economical.

1. Mr. Corson makes the statement, "There can be no difference of 2,300,000 lb. in the modulus of elasticity of Ambrac and Adnic, respectively." These tests were carried out in the laboratories of the American Brass and Scovill Manufacturing companies by competent metallurgists, and until Mr. Corson can produce figures to the contrary, they will stand as authentic.

2. "The physical properties of a 1-in. hot-rolled hexagonal rod are not the physical properties of the metal." I maintain that these are the true physical properties of the metal, as hot-rolled at a temperature of 1500° F. in the plant in which they were rolled.

The statement is also made, "In the annealed state the elongation of Adnic is higher than 46 per cent and the tensile strength is lower than 64,000 lb." We have reliable tensile test data showing the tensile strength as high as 67,800 lb. with the elongation in 2 in. of 47.6 per cent, and a reduction in area of 80.6 per cent, annealed at 700° C.

3. There is some basis for the statement, "Graphs which show the comparative change in tensile strength and other mechanical

* From Mining and Metallurgy, January, 1928.

properties of Monel and Adnic are definitely misleading." The comparative results, as shown in Fig. 1, were carried on with hot-rolled, not annealed, Monel and Adnic rolled No. 4 hard. The results of the tensile tests for Admiralty nickel in Fig. 2 were obtained by Messrs. H. J. French and W. A. Tucker, at the Bureau of Standards, 1924, by methods described in Technological Paper No. 219, and the results on Monel metal were compiled from Table 2, page 190, "Symposium on Corrosion Resisting Alloys," Proc. of the A. S. T. M., Vol. 24, 1924, Part II, Technical Papers. After a certain temperature has been reached, the initial properties of the material are lost and from that point on their physical properties depend on the inherent strength of the alloy.

This very point was thoroughly discussed with the technical representative of the manufacturers of Monel metal before the comparative data on Monel and Adnic, as shown in Fig. 2, were published.

In the elevated temperature testing of non-ferrous metals at elevated temperatures, what is called a strong drop by Corson between 400° and 750° C. is comparatively mild. Other alpha-non-ferrous alloys which we have tested show a similar drop.

WATERBURY, CONN., Nov. 30, 1927. WILLIAM B. PRICE.

## Ball Bearing Grinder

The Standard Electrical Tool Company, Cincinnati, O., is marketing a line of ball bearing, electrically driven grinders of two sizes, 3 h.p. and 5 h.p., equipped with 40 degree General Electric motors and General Electric push button control located on the outside of the pedestal. The machine has a high grade nickel steel armature shaft, S.K.F. ball bearings, emery wheel guards of the hinge door type and exhaust connections. Guards are equipped with spark breakers and polished wire-glass eye shield which is adjustible. There is a shaft locking device for use while changing emery wheels. The 3 h.p. grinder carries wheels 12 in. x 2 in. or 14 in. x 2 in., while the 5 h.p. type takes emery wheels as large as 18 in. x 3 in.

BALL BEARING GRINDER

## Pickling Solution Agent Addition

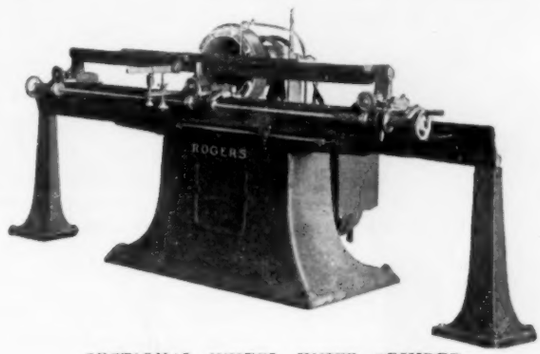
The American Chemical Paint Company, Ambler, Pa., is marketing an addition agent for pickling solutions which they call Rodine. Rodine is a liquid chemical which, when added to pickling solutions, is said to restrain action of the acid on the metal without retarding its action in removing the scale. It is useful especially for pickling steel preparatory to plating and finishing operations. Some of the advantages claimed for Rodine are as follows:

1. Prevents the acid from attacking the cleaned surfaces to which it is applied.
2. It reduces the acid consumption without slowing up the pickling.
3. It prevents the formation and escape of acid fumes from the bath.

The American Chemical Paint Company has published a revised edition of their bulletin No. 15, entitled "Pickling Made Efficient with Rodine." This bulletin describes the method of using Rodine for the improvement of pickling and cleaning operations.

## New Automatic Grinder

Samuel C. Rogers and Company, Buffalo, N. Y., announce an addition to their line of automatic knife grinders and saw sharpeners in the new Type "R" setcional wheel knife grinder. This machine is especially designed for grinding shear blades. It is equipped with a new 14-inch sectional grinding steel chuck with simple adjustment for holding and replacing segments. The sectional grinding wheel, it is claimed, permits much faster knife grinding than the solid wheel type because the spaces between




SECTIONAL WHEEL KNIFE GRINDER

the grinding sections form channels for carrying away the abrasive particles and the stock ground off the knife, and allows free entrance of the coolant to the actual grinding contact, which both carries away the heat generated and aids in washing away the refuse. In addition, there is economy of abrasive as the sectional wheels, it is claimed, can be replaced cheaper than solid wheels.

All sizes are equipped with an improved water attachment, and heavy yoke adjustable bottom supports to eliminate vibration, double ratchet feeding with automatic stop; ball bearing if desired; direct motor drive with built in standard 5 hp., 60 cycle motor, with starter, extended shaft, brackets, etc.; belt drive with tight and loose pulleys 8 inches in diameter with 3½-inch face to run 1,150 r.p.m.; leather belts, emery wheel dresser, wrench, etc. This new Type "R" machine will be made in eight different sizes, 76 in., 84 in., 90 in., 96 in., 108 in., 120 in., 130 in. and 144 in., to suit all needs.

## Chromic Compound Rack Covering

The Belke Manufacturing Company, Chicago, Ill., has perfected a coating process for racks and other equipment used in chromium plating. It is known as Belke Chromic Compound process rack covering and is a non-rubber substance which is applied in thicknesses of ⅛-in. or more, designed to resist chromic acid and plating solutions. The material is said to be permanent and to have the added advantage of providing a plating frame area as large as the area of the articles to be plated, making for economy of generator capacity. The covering is applied at the plant of the Belke company, where the substance is solidified in a heated vacuum. The company can either supply racks complete with Chromic Compound covering, or cover racks for those who have equipment needing application of the Belke Chromic Compound Process.

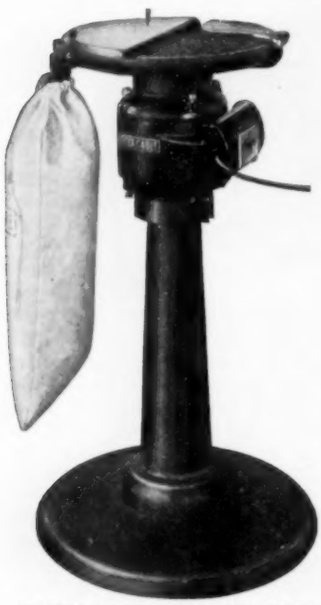
## New Scratch Brush Sections

A new type of circular wire brush section which is said to simplify the brush problems met with in scratch brushing, cleaning and rough polishing, has been placed on the market. The wires (which may be steel or brass wire or tampico as desired), are held in place on a balanced lead center by means of two stampings provided with projecting teeth which pass through the tufts of wires from each side and the holes provided in the plates. After assembling, the projecting ends of the teeth are bent over and clinched tightly against the surfaces of the opposite stampings to prevent the tufts loosening up after long use. These sections are manufactured by The Specialty Manufacturing Company, Cleveland, Ohio.

## Horizontal Disc Grinder

The Syracuse D-3 horizontal disc grinder manufactured by The Porter-Cable Machine Company, Syracuse, N. Y., was originally designed for a large manufacturer of small metal parts, to remove burrs and at the same time to secure a flat surface, in which work the machine was found highly satisfactory. It is claimed that the machine proved to be more rapid than a vertical disc grinder.

The operator sits in a chair beside the machine, rests his arm on the guard plate and using his elbow as a pivot, moves his hand through a small arc at one end of which is a box containing the parts to be burred and at the other end is the revolving disc. The disc quickly removes the burr and the dust is carried away by the vacuum dust system.



HORIZONTAL DISC GRINDER

This machine is said to be the only motor driven horizontal disc grinder of its size and should prove useful to automotive parts manufacturers, and to others, for burring innumerable small parts after milling, pressing, stamping, and screw machine operations. The advantages claimed for this grinder over an emery wheel are that grit, dust, and sparks are removed, a flat finish is secured, danger from breaking wheels is eliminated, and production is increased by having a proper support for the arm thus expediting feeding. An important safety factor is the housing which encloses the edge of the disc.

The solid iron disc is supported by an oversize thrust bearing built into the motor. It is controlled by a 2 pole push button switch conveniently located on the motor in which all wiring except the rubber covered conductor cable is concealed.

## New Red Protective Paint

Industrial plants in the Pittsburgh district are said to be adopting the new red protective paint developed by the General Electric Company for use with direct-current motors which are subject to acids, alkalies, oil or dust.

This paint is used on the ends of the commutators and between the ends of the commutator bars and comb, to prevent the entrance of oil, moisture, copper and carbo dust. In the Pittsburgh territory there are some companies which, upon installing a new commutator, apply a coat of this new paint to the section where the V rings fit in. The new comb rings are then installed and the insulated parts of the commutator are painted with the paint.

A number of mining companies in the central Pennsylvania field are using the paint on storage battery locomotives when a new battery is installed. The battery box, container, and top of the cells and terminals are given a liberal coat. This prevents corrosion.

The field coils on direct-current pump motors, exposed to oil and moisture, and the stators of induction motors are also being painted by several users. One coal mining company in Windber has also used the material for protecting the motors of mine locomotives, and in another instance the paint has been used to protect the under side of automobile mudguards. Several electrical repair shops in the district are informing their customers that the new paint must be used to protect the insulation adjacent to the commutator bars of direct-current motors. Among those using the product are manufacturers of fuel oil burners.

No. 880 Red Protective Paint, handled by the Merchandise Department of the General Electric Company at Bridgeport, Conn., prevents gas, oil and water leaks. It can be applied by brushing or dipping, requires no priming, and produces a hard, smooth and glossy film.

## Industrial Ovens

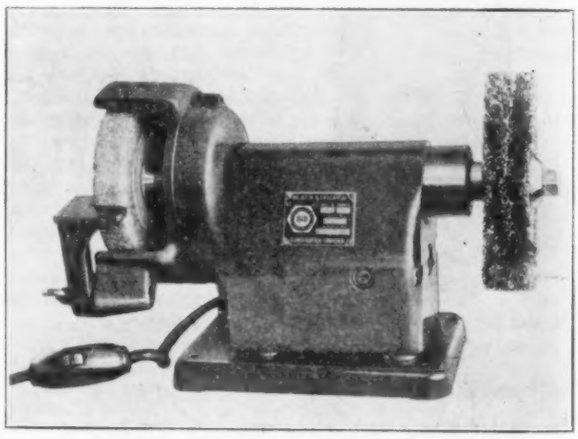
Freas industrial ovens, manufactured by The Thermo Electric Instrument Company, Irvington, N. J., are made in a variety of types for various industrial and scientific uses, such as baking lacquers, enamels and japans, drying materials, for laboratory tests and other purposes. The ovens are automatically controlled and embody a number of features which are claimed to make for a superior product. Among the advantages claimed for Freas ovens are better control of uniformity; quicker drying which speeds up production; economy by eliminating fuel waste and reducing replacement costs; clean operation, with no contamination of product; reduced fire risk. The Freas Thermo Regulator equipment on these ovens is said to maintain temperature with two degrees at any point desired, by means of a thermostatic element. There are specially designed racks, thoroughly insulated walls and positive-locking hinges on doors.

## Spray Gun for Heavy Fluids

A device has been developed whereby tar, asphalt, enamel, pitch, and other heavy fluids, may be sprayed; the article, known as the Quigley Bitumen Gun, manufactured by the Quigley Furnace Specialties Company, New York, is said to effect great economies by reducing the time of application of substances and its ability to control the temperature and thickness of coatings. The gun consists of a cast iron cylinder from which materials are forced by a piston capable of high pressure; the whole apparatus is enclosed in a steel housing and mounted on wheels. It is claimed that no skilled labor is necessary for operation.

## New Combination Grinder

Black & Decker Manufacturing Company, Towson, Md., has brought out a combination grinder which is said to be ideal for sharpening all kinds of edge tools, buffing and cleaning. It has



COMBINATION GRINDER

a speed of 2,400 R. P. M. and the universal motor is ball-bearing mounted. This grinder is furnished complete with a 5-in. grinding wheel on the left side of the spindle and a 6-in. wire wheel brush on the right side of the spindle. The wire wheel brush is interchangeable with buffs. It is furnished for 32, 110, 220 or 250 volts.

## New Hard Aluminum Alloy

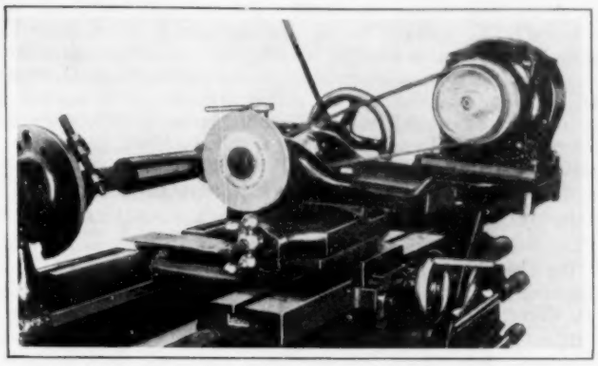
After considerable research Aludur, a new hard alloy of aluminum has been developed by the Societe Anonyme pour l'Industrie des Metaux, Lausanne, France. It is stated that this metal is of especial efficacy in the manufacture of optical, nautical and medical instruments, photographic apparatus, and other products requiring a light, strong, wear resistant metal. It is a special 98-99% aluminum, hardened by a special process. Resistance to corrosion, availability in all forms and easy machinability are some of the claims made for this product.

## Universal Tool Post Grinder

A universal tool post grinder that can be used with equal facility to do external, internal or surface grinding on any lathe with 12 in. or larger, swing has been placed on the market by the Atlantic Machine and Tool Company, 28 Canfield St., Orange, N. J. This grinder also can be used to do long surface grinding on a planer or shaper. It is a complete, self-contained unit which, by increasing the utility of lathes, shapers and planers, provides shops where grinding is more or less of an occasional operation with a powerful grinder without investing in universal grinding machines. Weighing but 56 lbs., it can be mounted or taken down in a few minutes time.

A cup wheel is used to do surface grinding on a lathe and a 5½ in. x ½ in. wheel on a planer or shaper. A 5½ in x ½ in. wheel likewise is used to do external grinding on the lathe. For internal grinding two extension arbors are provided, enabling the grinding of internal surfaces from ⅝ in. diameter up and to 6 in. in length.

The frame is a gray iron casting with black enamel finish. The spindle is of hardened, ground and lapped high carbon machine steel driven at a speed of 3,500 or 5,500 r.p.m. by a ¼ h.p. constant speed A.C. or D.C. General Electric motor, which is mounted on a dove-tailed slide for adjustment of belt elongation. It is claimed that the greatest possible precision is assured by mounting the two step pulley on the center of the grinding spindle between the front and rear bearings; that this mounting, as opposed to mounting the pulley on the end of the spindle, keeps the grinding



UNIVERSAL TOOL POST GRINDER

wheel in perfect alignment by distributing the belt pull equally to both bearings. It is sold in an oak cabinet with extra spindles, wrenches, wheels, etc. Shipping weight: 75 lbs.

# Equipment and Supply Catalogs

**Ruggles-Coles Dryers.** Hardinge Company, York, Pa.

**Duro-Chrome.** General Chromium Corporation, Detroit, Mich.

**Hardinge Thickener and Clarifier.** Hardinge Company, York, Pa.

**Rotary Car Dumpers.** Roberts and Schaefer Company, Chicago, Ill.

**Architecture and Rust Proofing.** Parker Rust-Proof Company, Detroit, Mich.

**Brown Multiple Recorders.** The Brown Instrument Company, Philadelphia, Pa.

**Parker Rust-proofing Process.** Pyrene Manufacturing Company, Newark, N. J.

**Polishing Composition and Buffing Wheels.** E. Reed Burns & Sons, Inc., Brooklyn N. Y.

**The Standard Electric Drills, Grinders and Buffers.** The Standard Electrical Tool Company, Cincinnati, O.

**A Directory of Approved Correspondence Courses.** The National Home Study Council, Washington, D. C.

**Buyers' Guide**—Monel Metal and Pure Nickel Products. The International Nickel Company, New York.

**Paying Employes by Check.** Policyholders Service Bureau, Metropolitan Life Insurance Company, New York.

**R & H Advertisements and Their Purpose.** The Roessler and Hasslacher Chemical Company, New York City.

**Starting and Operating Characteristics of the Lincoln Switch Start Motor.** The Lincoln Electric Company, Cleveland, O.

**New Haven Model C Radial Blast Barrel.** The New Haven Sand Blast Company, New Haven, Conn. This is claimed to be the first, self-contained blast barrel employing patented radial blasting in an unobstructed chamber.

**CR3110 Drum Controllers** for crane hoist motors, etc., General Electric Company, Schenectady, N. Y. Other General Electric Catalogs: **Type BTA Motors,** adjustable speed, alternating current, brush shifting; **G-E Pot-type Electric Furnaces,** for lead hardening.

# Associations and Societies

### REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

## American Foundrymen's Association

HEADQUARTERS, 140 SOUTH DEARBORN STREET, CHICAGO, ILL.

#### OFFICERS NOMINATED

The tellers appoited by President Utley to canvass the ballot for the election of four members of the Nominating Committee, reported the election of T. S. Hammond, Werner G. Smith, H. B. Swan and Albert Weber, to serve with past presidents G. H. Clamer, L. W. Olson and A. B. Root, Jr. At the meeting of the committee held in Cleveland, February 6th, the following were nominated as officers and directors of the Association:

For President, to serve for one year: S. T. Johnston, vice-president and general manager, The S. Obermayer Company, Chicago, Ill.; For Vice-President, to serve for one year: Fred Erb, president, Erb-Joyce Foundry Company, Detroit, Mich.; For Directors, to serve three-year terms each: S. W. Utley, vice-president, Detroit Steel Casting Company, Detroit, Mich.; L. W. Olson, works manager, Ohio Brass Company, Mansfield, Ohio; B. H. Johnson, works manager, Cresson-Morris Company, Philadelphia, Pa.; Peter J. Krentz, vice-president and works manager, Buffalo Foundry and Machine Company, Buffalo, N. Y.; C. E. Hoyt, executive secretary, American Foundrymen's Association, Chicago, Ill.

Article IX, Section 3, of the By-Laws reads: "Any twenty-five members, by petition filed with the secretary not less than sixty days prior to the first day of the annual convention, may nominate candidates for officers and directors."

Article X, Section 1, reads: "Should no other candidates for officers and directors be nominated in the manner provided in Article IX, Section 3, then the candidates nominated by the Nominating Committee shall be declared elected for the terms of office for which they were nominated."

The By-Laws also provide that the newly elected officers and directors shall assume office at the annual meeting of the Board of Directors, which shall be held within ninety days of the closing date of the Annual Convention of that year.

#### CONVENTION PROGRESS

Convention plans are progressing. The December Bulletin had a tentative schedule of Convention sessions and the March Bulletin will show the complete program. The morning sessions will be held at the Bellevue-Stratford Hotel and the afternoon sessions at the Commercial Museum, Philadelphia, Pa., where convention headquarters will be located.

It would require pages to tell about the new equipment and devices which will be shown at the Exhibit. It will be the greatest ever. No progressive foundryman can afford to miss this feature of Foundrymen's Week.

## Quad-City Foundrymen's Association

HEADQUARTERS, CARE OF H. A. DEANE, DEERE AND COMPANY, MOLINE, ILL.

The meeting of the Association, February 20, 1928, was well attended. The speaker of the evening was J. W. Collins, superintendent of the Detroit foundry of the Aluminum Company of America, whose subject was **Aluminum Castings.** Mr. Collins who served an apprenticeship as a molder in Canada before coming to the United States in 1905, delivered a very interesting and instructive talk.

## Foundry Equipment Manufacturers

HEADQUARTERS, CARE OF H. C. ESTEP, PENTON BUILDING, CLEVELAND, O.

The following officers were elected at the annual meeting of the Foundry Equipment Manufacturers' Association on February 7, 1928: President, S. C. Vessy, W. W. Sly Mfg. Co., Cleveland; vice-president, Henry W. Standart, Northern Engineering Works, Detroit. H. Cole Estep, Penton Building, Cleveland, was re-elected secretary-treasurer. Mr. Standart was also elected a director for the term ending February, 1931, together with A. F. Jensen, Hanna Engineering Works, Chicago. Mr. Vessy was re-elected a director. In addition to the foregoing the board now includes T. W. Pangborn, Pangborn Corporation, Hagerstown, Md., past president, and E. O. Beardsley, Beardsley and Piper Company, Chicago.

The members were addressed by Whiting Williams, Cleveland, on the subject, **What is Industry Doing to Us?** and by E. F. DuBrul, manager National Machine Tool Builders Association, who discussed the possibility of common action between trade associations to invoke those provisions of the Clayton Act relating to unethical buying methods.

## Testing Materials Society

HEADQUARTERS, 1315 SPRUCE STREET, PHILADELPIA, PA.

IMPORTANT COMMITTEE MEETINGS

The following are among the committees of the American Society for Testing Materials, and certain joint committees, are holding meetings in conjunction with a four-day group meeting in Washington at The Mayflower, over the dates of March 20, 21, 22 and 23:

B-1 on Copper Wire; B-3 on Corrosion of Non-Ferrous Metals and Alloys; Sec. Comm. on Zinc Coating of Iron and Steel; Sub-Comm. IV, D-14, on Testing of Wire Screen Cloth.

## American Electroplaters' Society

HEADQUARTERS, CARE OF W. S. BARROWS, 628 DOVERCOURT ROAD, TORONTO, CANADA

CONVENTION NOTES

Our program goes to press April 10th. All copy of advertising, names of those presenting papers, titles of papers, etc., should reach us not later than April 1st in order to facilitate early distribution of souvenir program. We want a copy of this issue to reach the foreman plater, chemist, and manager of every metal finishing plant it is possible to locate. Send addresses to the Secretary of the Convention Committee now, addressing it to headquarters given above.

The contributions to the educational program received to date indicate a superior quality of papers for this convention. **Cadmium versus Zinc, and Chromium, Its Value as a Protective Coating,** will afford excellent opportunity for discussion. Managers of manufacturing plants and members of technical staffs connected with such plants are respectfully invited to attend this convention and participate in the discussions.

A motor trip to Toronto from any point in the United States affords a delightful change of scenery and acquaintance with customs slightly different from those at home. You will enjoy it. Toronto is a mighty popular city: everybody likes to come here; they never hurry away. Make reservations early. Make up a Toronto party, let us know when you will arrive in Toronto, we will have a bus meet you and the cost will be less than half the regular taxi fare.

Platers bringing exhibits of finished goods to the convention will experience no difficulty crossing the border if incomplete samples are used and the purpose of bringing them into Canada is made plain to the Inspector of Customs. Bring a good exhibit and let us have a real contest.

W. S. BARROWS, Secretary.

## Newark Branch

HEADQUARTERS, CARE OF R. F. CLARK, P. O. BOX 201, NEWARK, N. J.

The Branch will hold its Tenth Annual Banquet and Educational Meeting at Achtel-Stetter's, 846 Broad Street, Newark, N. J., on April 14, 1928. The educational session will start at 3:00 p. m. sharp, and all who are interested are invited to attend. The following program has been arranged:

**Address of Welcome,** Charles H. Bohler, president, Newark Branch; **Chromium Plating, Past, Present and Future,** by Charles H. Proctor, research engineer, Roessler and Hasslacher Chemical Company, New York; **Chromium Experiments,** by Oliver J. Sizelove, instructor in electroplating, Vocational School, Newark, N. J.; **Cathode Potential,** by Dr. A. Kenneth Graham, chemical engineer, Hanson-Van Winkle Munning Company, New York; **Some Aspects of Chromium Plating,** by Dr. Hiram A. Lukens, Professor of Electrochemistry, University of Pennsylvania; **Silver Solutions,** by G. Byron Hogaboom, Jr., Columbia University, New York City; **Electroplating Aluminum with Nickel** by Harold S. Work, Research Fellow, The Aluminum Company of America. The banquet will follow the educational session.

On Friday, February 17, 1928, the Branch held a regular meeting at which 26 members were present, including all but one of the officers. John A. Hanley of the Detroit Branch was accepted as an associate member by transfer; J. D. Holland was elected to associate membership; applications for membership were received from H. Hebestrait and W. Connell. It was reported by George Onksen, chairman of the banquet committee that preparations for the banquet were progressing satisfactorily.

The discussion for the evening was on chromium. George B. Hogaboom spoke on the subject of **Why Doesn't a Chromium Solution Plate?** Mr. Hogaboom explained the difficulties encountered in chromium plating, and in another talk, **The Future of the Electroplater,** he made some very interesting remarks.

## Milwaukee Branch

HEADQUARTERS, CARE OF J. N. HOCK, 1229 W. 24TH STREET, MILWAUKEE, WIS.

1928 BANQUET

There will be a banquet and educational session of the Milwaukee Branch on Saturday, March 31, 1928, at the New Schroeder Hotel, corner of 5th Street and Wisconsin Avenue, Milwaukee. The educational session will start at 2:30 p. m., and the banquet at 7 p. m. The general committee consists of Ray Goodsell, chairman; Bob Steuernagel, finances; Jack Geisman, music and entertainment; Henry Hurtig, hotels. Librarian Frank Marx will have charge of the educational session, over which Pat Sheehan will preside.

While Mr. Marx has not yet fully completed his program for the session, the following tentative program gives promise of a fine session:

**The Protective Value of Coatings of Nickel, Copper** and **Chromium,** by Prof. Edwin Baker, University of Michigan; **Antique Finishes for Lighting Fixtures,** by Charles Proctor; **A Half-Hour Talk on Plating Room Troubles,** with lantern slide illustrations, by Fred Liscomb; **Symposium on Chromium Plating,** by Paul Segnitz, consulting engineer; and a **General Discussion of Chromium Plating,** when all present will be invited to speak.

There will be dancing after the banquet. If the affair is successful, the Branch expects to make it an annual function. It might be well to note here that the New Schroeder Hotel is only two blocks from either the North Shore Terminal or the C. M. and St. P. passenger depot.—D. W.

## Rochester Branch

HEADQUARTERS, CARE OF S. P. GARTLAND, 128 BRYAN STREET, ROCHESTER, N. Y.

The Rochester Branch will hold its annual banquet and educational on March 17, 1928, at the Powers Hotel, Main Street West, Rochester; the session starting at 4 p. m. and the dinner at 6 p. m. Orders for reservations should be directed to Charles Griffin, 24 Garson Avenue, Rochester.

S. P. GARTLAND.

## International Fellowship Club

HEADQUARTERS, CARE OF F. J. CLARK, 43 FORT PLEASANT AVENUE, SPRINGFIELD, MASS.

The meeting and luncheon of the International Fellowship Club, held at the Aldine Club, New York City, on February 18, 1928, was a highly successful function, a great number of members and guests having gathered for a splendid afternoon. George B. Hogaboom, president of the Club, delivered a short address of welcome, after which he turned the meeting over to Frank J. Clark, vice-president, who was chairman of the meeting. Frank G. Space, purchasing agent of the Seymour Manufacturing Company, Seymour, Conn., and a past president of the Connecticut Purchasing Agents' Association, delivered a talk on **Sales Ethics from a Purchasing Agent's Viewpoint.** This was very interesting and instructive.

## British Institute of Metals

HEADQUARTERS, 36, VICTORIA STREET, LONDON, S.W. 1, ENG.

### ANNUAL GENERAL MEETING

The annual general meeting of the Institute was held March 7 and 8, 1928. The following are the newly elected officers: W. Rosenhain, D. Sc., F.R.S., president; Professor D. Hanson, D. Sc., R. S. Hutton, D. Sc., John Fry, and R. Seligman, Ph.D., vice-presidents. The annual dinner and dance was held on the evening of March 7. The technical sessions were held on both days, the following papers being submitted:

Norbury, A. L., D.Sc. "The Effect of Quenching and Tempering on the Mechanical Properties of Standard Silver."

Chadwick, R., B.A., A.I.C. "The Constitution of the Alloys of Magnesium and Zinc."

O'Neill, Hugh, M.Met., M.Sc. "Historical Note on Density Changes caused by Cold-working of Metals."

Cowan, William A., B.A. "Minute Shrinkage Cavities in Some Cast Alloys of Heterogeneous Structure."

Cowan, William A., B.A. "Note on the Composition of Old Roman Lead."

Friend, J. Newton, D.Sc., Ph.D., F.I.C., and Thorneycroft, W. E., B.Sc. "An Example of Roman Copper 'Soldering' and Welding from Uriconium."

Grimston, Major F. S., C.I.E. "Season-Cracking of Small Arms Cartridge Cases During Manufacture."

Bailey, G. L., M.Sc., A.I.C. "The Influence of Dissolved Gases on the Soundness of 70:30 Brass Ingots."

Friend, J. Newton, D.Sc., Ph.D., F.I.C. "The Relative Corrodibilities of Ferrous and Non-Ferrous Metals and Alloys. Part 1.—"The Results of Four Years' Exposure in the Bristol Channel."

Griffiths, Ezer, D.Sc., F.R.S., and Schofield, F. H., B.A., B.Sc. "The Thermal and Electrical Conductivity of Some Alumininum Alloys and Bronzes."

Allibone, T. E., M.Sc., Ph.D., and Sykes, C., M.Sc. "The Alloys of Zirconium.—I."

Beckinsale, S., B.Sc., A.I.C., and Waterhouse, H., M.Met. "The Deterioration of Lead Cable Sheathing by Cracking, and its Prevention."

Haas, Max, Dr.Ing. "The Dilatometric Study of Light Metals."

Hargreaves, F., A.R.S.M. "The Ball Hardness and the Cold-Working of Soft Metals and Eutectics."

Kent, W. L., B.Sc. "The Behaviour of Metals and Alloys During Hot-Forging."

Matsuda, Tsotomu, Sc.D. "On the Quenching and Tempering of Brass, Bronze and Aluminium-Bronze."

### AUTUMN MEETING

The annual autumn meeting will be held in Liverpool from September 4 to 7, 1928. It is hoped that the early notification will enable many members to arrange to attend the Liverpool meeting. The local reception committee, under the chairmanship of Professor C. O. Bannister has already drafted a very attractive program, details of which will be announced later.

# Personals

## S. Skowronski

The election in February of S. Skowronski to the office of Chairman of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers presents an opportunity for a review of the career of one of the best known men in the field of non-ferrous metallurgy.

In 1904 Mr. Skowronski graduated from the Massachusetts Institute of Technology. From then until 1912 he held positions as a chemist with a number of firms. Going first to the Republic Rubber Company, Youngstown, Ohio, he soon went over into the metal field, becoming a chemist for the Ohio Steel Works, Youngstown, and later occupying positions in the laboratories of the American Smelting and Refining Company at Maurer, N. J., and the C. L. Constant Company, New York City. In 1912, Mr. Skowronski took charge of the research department of the Raritan Copper Works of the Anaconda Copper Mining Company.

Mr. Skowronski has always taken a very active interest in all the chemical, electrochemical and metallurgical societies. When the National Research Council was functioning, he was secretary of its Selenium-Telenium Committee. He is the author of numerous papers dealing with the refining of copper and its by-products.

In regard to his election as Chairman of the Institute of Metals Division, Mr. Skowronski's own statement may be given:

"No one was more surprised than myself at my election. While I had not aspired to this honor, I plan to take my duties seriously and to work diligently for the steady progress of the Institute. I will welcome aid and suggestions as to the presentation of papers and the arrangement of symposiums and technical meetings."

---

Ires **Prosser** is now Southeastern representative of the Bonfield Refractories Company, Philadelphia, Pa., covering the territory from North Carolina to San Antonio, Texas. His headquarters are at Atlanta, Ga.

**O. D. Fries** is now salesman in charge of consumer motor buisness of The Lincoln Electric Company, Cleveland, O., in the Detroit territory, under the direction of J. M. Robinson, district manager.

**John R. Searles** has resigned his position as president of the Michigan Smelting and Refining Company, Detroit, Mich. No successor has as yet been chosen and a further announcement by the company is awaited.

**Laurence Thompson,** formerly Cleveland district manager for the United States Electric Tool Company, Cincinnati, O., is now Cleveland district sales engineer for the New Haven Sand Blast Company, New Haven, Conn. Mr. Thompson is located at 355 Erie Building, Cleveland, and his efforts will be mainly in the Detroit district.

**C. E. Luttrell,** for five years manager of the Knight-Luttrell Iron Company, Atlanta, Ga., is now in charge of the iron and steel department of Thomas F. Seitzinger's Sons, Atlanta, dealers in metals, iron and steel, with smelting and refining as well as brass, bronze and aluminum foundry departments.

**James H. McGraw,** president of the **McGraw-Hill Publishing Company,** New York, was awarded the Harvard Advertising Award gold medal for distinguished individual service to advertising. The award is the greatest of ten honors established by Edward Bok, and presentation to Mr. McGraw is considered a recognition of not only the work of Mr. McGraw but of the influence and value of the business press throughout the country.

---

## Cu 50—Zn 30—Ni 20

Recently, during one of the technical meetings in New York, two prominent metallurgists, **W. M. Corse,** a nickel man, and **W. H. Bassett,** a brass man, were seen to bump into one another; which prompted the editor to inquire about the probable results of such a collision.

"Nickel silver, of course," answered the brass man like a flash, thereby proving that he was sterling silver-tongued.

# Obituaries

## Walter L. Abate

Walter L. Abate, brass finishing editor of The Metal Industry, died suddenly on February 20, 1928, at his home in Detroit, Mich. Mr. Abate is survived by his widow, Adda Abate, and two sons, Walter Malcolm and Edwin Britton Abate. He was sixty years of age.

Walter L. Abate spent more than forty-nine years in the brass industry. He was born at Detroit Mich., November 1, 1867, attended the public schools there, and afterward served a four-year apprenticeship with the firm of James Flower & Brother, manufacturers of machined brass goods, valves, plumbing material, and also job brass machinists. Here he was taught practically all lines of brass work, the apprenticeship carrying him into all parts of the company's shops and providing him with a good fundamental experience in the industry. Mr. Abate chose to specialize in brass work and he was placed in the brass department of the Flower company, under the supervision of David B. Buick, who later developed the automobile of that name, now an important product of the General Motors Corporation. Here, also, Mr. Abate came in contact with Henry Ford, who was an apprentice in the machine shop of the Flower works at that time. The two boys were accustomed to walk home from work together daily; a salary of $1.50 per week for apprentices made it necessary for them to cover a seven-mile walk each day.

WALTER L. ABATE

At seventeen Mr. Abate left Flower's, and until he was twenty-one he held jobs with a number of concerns. Then he became foreman of a small group of men at the shops of the Detroit Ship Building Company, where he was later promoted to foreman of the brass department. Mr. Abate was active in the development of lubricators and injectors, doing a great deal of this work while in the employ of the Penberthy, American Injector, and Detroit Lubricator companies, for whom he worked during a period of ten years after leaving the Detroit Ship Building Company. For three years Mr. Abate was superintendent of the brass department of the Michigan Brass and Iron Company. During four years as superintendent of the McRae & Roberts Company he developed a new chucking lathe which used an air chuck. He next spent seven years as general manager for the Nathan Manufacturing Company, New York, leaving that firm to become general superintendent of the brass shops of the Standard Sanitary Manufacturing Company, Pittsburgh, Pa.

Mr. Abate then took up engineering work. He spent a year with the Haydenville Brass Works, Haydenville, Mass., of which he later became secretary. At the outbreak of the war in Europe he was production manager for the American Pin Company Waterbury, Conn. When the United States entered the war he returned to Michigan as a member of the Ordnance Department, taking charge of fuse production at the plant of the Hancock Manufacturing Company, Charlotte, Mich., from which he was later transferred to the Cadillac Motor Car plant to take charge of the production of Liberty bearings until the end of the war. For nearly three years after the war he remained with the Holley Carbureter Company, doing engineering work and contributing to the development of the permanent mold and the necessary patterns. For this work he installed the initial iron foundry equipment.

He always was interested in new developments, with especial regard for those appliances that were used or made in brass plants. At one time he worked on a new type of furnace known as the M. R. V. He spent the latter part of his life in the brass business for himself, operating under the name of W. L. Abate at 2085 Clark Avenue, Detroit. During this time he attended to brass finishing problems for The Metal Industry, and having given practically his entire life to the brass industry, his services were indeed valuable to the publication and to its readers.

Mr. Abate was active socially as well as in his chosen field of industry. He was a life member of Hiawatha Lodge 434, F. and A. M., Mount Vernon, New York; the Y. M. C. A.; and the Scovel Memorial Presbyterian Church, Detroit, for which he was an active worker for some years.

## Mrs. Maude A. Magnuson

Mrs. Maude A. Magnuson, vice-president and one of the founders of the Magnuson Products Corporation, manufacturers of industrial cleaners, of Brooklyn, N. Y., passed away on February 8, 1928, after she suffered a heart attack. She is survived by her husband, Edward Magnuson, president and treasurer of the Magnuson company, and her mother, Mrs. Pauline Rogers. She was 47 years of age.

Mrs. Magnuson was an active business woman for many years. In 1910, following her marriage to Edward Magnuson, she aided her husband in the development of some 50 formulas for soaps and industrial cleaners, with which they started a concern known as the National Pure Soap Company, of which she became office manager and Mr. Magnuson superintendent. Later, the Oakley Chemical Company made them an offer which induced them to leave their own company and enter the employ of the Oakley company. Here Mr. and Mrs. Magnuson travelled through New England on sales tours, and later they were both active in training salesmen for this and other territories.

MRS. MAUDE A. MAGNUSON

In 1921 they severed their connection with the Oakley company to found, with William M. Campbell, another Oakley man, the Magnuson Chemical Company, of which Mrs. Magnuson became vice-president. In October, 1923, Mrs. Magnuson and her husband withdrew from this concern and founded the Magnuson Products Corporation. Mrs. Magnuson displayed unflagging interest in the development of this concern, continuing to work even after she was handicapped by illness.

## Walter Bauer

Walter Bauer, president of the Pyrene Manufacturing Company, Newark, N. J., died on February 12, 1928, after an illness of 3 days due to a severe attack of pneumonia. He was 44 years old.

Mr. Bauer's early business training was with the Fort Wayne Electric Company and General Electric Company. Following this connection he was Assistant General Manager of the American Eveready Company. He was vice-president of the American Chicle Company from 1916 to 1918 and president of the Pyrene Manufacturing Company from 1918 to 1928.

## Charles F. Kinsman

Charles F. Kinsman, chairman of the board of directors of the Sterling Bronze Company, New York, died on February 7, 1928, at Sarasota, Fla. He was 61 years old.

For more than 30 years Mr. Kinsman was prominent as a manufacturer of lighting fixtures and other non-ferrous metal products. He was one of the founders of the Sterling company and was its president from 1919 to 1927.

## John Leber

John Leber, president and general manager of L. Leber and Son, Inc., metal refiners, of Newark, N. J., died on February 4, 1928.

# News of the Industry

## Industrial and Financial Events

### New Bridgeport Brass Officials

Charles E. Beardsley of Waterbury, Conn., was elected president of the Bridgeport Brass Company at a meeting of the directors of the company on February 28, 1928. Carl F. Dietz, former president of the company, and R. T. Kent, general manager, resigned two months ago. Ralph E. Day, former general manager of the Waterbury branch of the American Brass Company, and later manager of the American Brass plant at Hastings-on-the-Hudson, was chosen general manager of Bridgeport Brass following the resignations.

Mr. Beardsley was for many years manager of one of the American Brass Company plants in Waterbury. He later became president of the Novelty Manufacturing Company of Waterbury and combined it with the Risdon Company of Naugatuck under the name of the latter, becoming president of the consolidated concern. A few months ago he formed the Beardsley Manufacturing Company, which took over the former Novelty plant from the Risdon Company, and last month he formed a new company, the Beardsley and Wolcott Manufacturing Company, which took over the Beardsley Company and the Wolcott Manufacturing Company of Hartford. He is also still a director of the Risdon Company.

The directors of the Bridgeport Brass Company elected George T. Wigmore of Naugatuck treasurer of the Bridgeport Brass Company. He is treasurer of the Risdon Manufacturing Company and a director of the Beardsley and Wolcott Manufacturing Company. The stockholders chose two new directors, Paul D. Hamilton and Rowley W. Phillips, of Waterbury.

Since the death of F. J. Kingsbury, who held slightly more than one-third of the company's stock, the stock owned by his estate has been voted by the trustees of the estate, one of whom is Mr. Phillips, an officer in the R. F. Griggs Company, investment brokers of Waterbury. It was the Griggs Company which handled the financing of the Beardsley Manufacturing Company and the Beardsley and Wolcott Manufacturing Company. Mr. Hamilton represents the Hamilton estate, which is said to control another third of the Bridgeport company's stock.

William R. Webster was reelected vice-president and the following directors were elected besides Mr. Beardsley and Mr. Wigmore: Ralph E. Day; Charles G. Sanford, chairman of the board of the First National Bank of Bridgeport; Waldo C. Bryant of the Bryant Electric Company, Bridgeport; Burgoyne Hamilton of New York; F. Kingsbury Bull of Litchfield; Frederick J. Kingsbury, 3rd, of New Haven.—W. R. B.

### Aluminum Company Earns $13,000,000

The Aluminum Company of America reports for the year 1927 net income of $13,671,940 after depreciation, depletion, Federal taxes, bond premium and unamortized discount and other charges. In 1926 the net income after taxes and depreciation but before bond interest was $19,747,068. In making his report, President Arthur V. Davis, said:

"In 1926 and most prior years, our sales of aluminum have exceeded our output, the deficit being made up of stocks on hand and purchases from others of new and secondary aluminum. In 1927, however, while our output was approximately a third more than in 1926, our sales were substantially less than our output. This results in our having the largest stock of aluminum on hand that we have ever had. This stock, however, is carried at cost, and when sold will result in a profit."

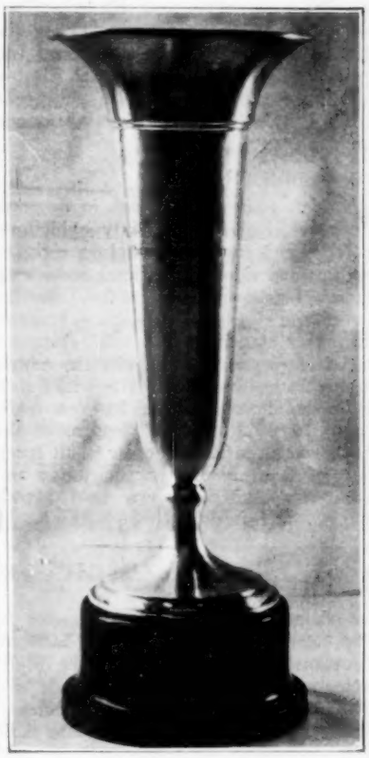
### Scovill Profits in 1927

Scovill Manufacturing Company, Waterbury, Conn., reports for the year 1927 net income of $2,253,218 after all charges, as compared with profits of $2,979,701 in 1926.

### Prizes for Safety in Metal Works

Awards to winning contestants in the Industrial Accident Prevention Contest of The Merchants' Association of New York, which was conducted over a four-month period ending December 31, 1928, have been made, the results showing that 22 shops went through the entire period, operating a total of more than 800,000 man hours, without any lost time accidents. These were given framed certificates. There were 50 firms in the contest.

The employees of Stanley and Patterson, Inc., manufacturers of electrical supplies, which company finished in first place, operating its plant of 250 employees for a total of 214,416 man hours without accident, were awarded one hundred dollars in gold in addition to a certificate. Two companies, while not mainting perfect records, received honorable mention for their efforts. These companies were the American Safety Razor Company and the Sperry Gyroscope Company.



SAFETY TROPHY FOR METAL WORKING PLANTS

It was announced that The Merchants' Association is now promoting accident prevention through the medium of contests in three industries in the Metropolitan District.

The first of these, in the metals group, is a continuation of the contest which ended on December 31. It started January 1, 1928, and will continue until the end of the year. In addition to the certificates which will be given to the plants showing no lost-time accident records, the plant winning the contest will receive the large sterling silver trophy vase shown in the illustration, which was donated by one of the contestants, and the plants finishing in second and third place will be awarded trophy banners. Over a hundred plants have entered the contest.

### Gets $8,000,000 in Aluminum Suit

A verdict of $8,000,000 in favor of George D. Haskell, president of the Bausch Machine and Tool Company, was brought in on February 14, 1928, by a jury in the Federal Court, Newark, N. J., in a damage suit for $45,000,000 against the estate of the late James B. Duke. Mr. Haskell's allegation was that after entering into an agreement with the plaintiff to exploit a vast aluminum project, Mr. Duke sold out to the Aluminum Company of America for a sum approximating $25,000,000, causing Mr. Haskell actual loss of $15,000,000. Suit for triple damages was permitted under the Sherman anti-trust act, which provides for such damages where loss is sustained from conspiracy in constrain of trade. The suit has been carried on for about two years, and may continue again as Mr. Haskell is expected to move for multiplication of the $8,000,000 verdict by three, whereas the Duke interests are expected to appeal the case.

## Electroplating at Power Show

Using tiny enameled dishes for tanks and a small motor-generator and buffing outfit, a demonstrator for the W. Green Electric Company, New York, demonstrated to large crowds the simplicity of electroplating methods, at the sixth annual Electric Power Show, held the week of February 20, 1928, at the exhibition rooms of the New York Edison Company, 130 East 15th Street, New York City. The booth was probably given more attention than any other single exhibit at the show, an added attraction having been the offer of the demonstrator to electroplate any small article free of charge.

There were numerous exhibits of interest to the metal industry. Small power tin shears which can be held in the hand were shown by The Unishear Company, Inc. Blowers, fans and ventilating machines were on exhibition at the booths of the American Blower Corporation and several other concerns. Grinding, buffing and polishing machinery were shown by the Black and Decker Company, the Hisey Wolf Machine Company, Apex Rotarex Corporation, the Graybar Electric Company; The Biax Flexible Shaft Company showed equipment for portable grinders, etc. Other displays were made by the R. L. Carter Company, De Bothezat Impeller Company, Inc., Foley Saw Tool Company, General Electric Company, Hess and Hicks, Inc., Silent Hoist Winch and Crane Company, Skilsaw, Inc., Stimmel Winch and Machine Works and J. D. Wallace and Company.

### ELECTRIC SIGN SHOW

The sixth annual Electric Sign Show, which was in progress from February 6 to 11, inclusive, had fifty to sixty exhibitors. In addition to metal signs large and small, the displays included many metal advertising novelties and sign accessories. Some very new ideas in sign advertising were shown.

### ELECTRIC TRUCK SHOW

The latest models of electric street trucks and electric vehicle equipment were on exhibition at the 8th annual Electric Truck Show, which was also held in the showrooms of The New York Edison Company, March 5 to 10, 1928. A new feature of the show was a three-day electric truck conference, open to all truck operators and representatives of firms having transportation and delivery problems to solve. This conference was held March 6, 7 and 8, in the auditorium of the Fifteenth Street building.

## Industrial Research Survey

The value and importance of industrial research as a factor in American prosperity is to be determined by a survey of 5,000 of the largest manufacturing concerns in the country, under the direction of aurice Holland, Director of the Division of Engineering and Industrial Research of the National Research Council. The survey is expected to provide the first set of comprehensive, authentic data on the effects of the present expenditure of $200,000,000 for industrial rsearch in the United States.

## To Expand Cadmium Output

Increased consumption of cadmium has moved Silesian producers to revise their methods in an effort to increase their output, according to advices from abroad. Silesian production has been 40 tons annually; this is now to be expanded to 100 tons. The entire world production in 1927 was 550 tons, Silesia being the world's third largest producer, with the United States first and Australia second.

## Acme Brass and Metal Works

Acme Brass and Metal Works, Waupaca, Ill., has been acquired by a group headed by E. J. Fuller. It is planned to install considerable new equipment. A gray iron casting unit is to be added to the present battery of brass furnaces.

## Bohn Aluminum Profits Gain

The Bohn Aluminum and Brass Corporation and subsidiaries report for 1927 a net profit of $1,181,606 after all charges, which compares with $873,744 for 1926.

## British Jewellers Define Alloys

**The Birmingham Jewellers' and Silversmiths' Association** has issued a report in which they define various terms indicating the quality of the precious metals and their alloys. A "gold front" is defined as a sheet of gold of a standard not lower than 9 carats which is made in a separate portion and afterwards attached to a silver or base metal back in such a way that the separate sheet of gold can be removed from the silver or base metal back.

Rolled gold is a sheet of gold not lower than 9 carats sweated or soldered to a sheet or bar of silver or base metal, the whole being rolled down together or, in the case of wire, a core of silver or base metal completely surrounded with gold of a standard not lower than 9 carats sweated or soldered on and drawn down together in such a way that on annealing and pickling a surface of gold will be shown. Other definitions are as follows:

Gold filled: A sheet of gold of a standard not lower than 9 carats sweated or soldered to each side of a bar or ingot of silver or base metal, the whole being rolled down together or, in the case of wire, a core of silver or base metal completely surrounded with gold of a standard not lower than 9 carats, sweated or soldered on, the whole being drawn down together in such a way that on annealing and pickling a surface of gold will be shown.

Gold Shell: A casing of gold of a standard not lower than 9 carats on silver or base metal, the casing being of such thickness that when the base is dissolved in acid the gold shell is left intact.

Gold cased: Silver or base metal having thereon an electrodeposit of gold of such density that neither nitric acid of 1.40 specific gravity nor lunar caustic applied for two minutes will discolor or stain it.

Gilt: Silver or base metal having gold deposited thereon by chemical or electro-deposition process.

Fire Gilt or mercurial gilt: A covering of gold dissolved in mercury from which the mercury has been burnt out by firing.

These descriptions have been approved by the **London Wholesale Jewellers' and Allied Trades' Association** and the **National Association of Goldsmiths.**—J. H.

## Zucker Sons' Company to Move

Zucker Sons' Company, Inc., now located at Elizabeth, N. J., will move on or about April 1, 1928, to their new brick and steel plant at Roselle, N. J., where considerably larger facilities for the company's manufacture of rouge and other polishing compositions will be available. The new plant is on the main line of the Central Railroad of New Jersey, is equipped with practically all new machinery, including devices for easy handling of large orders and new mixing machines with improved heat control apparatus and labor saving processes. There will also be more office space. The works at present will cover only a small part of the company's land at Roselle, so that new additions or buildings can be erected as needed. The moving is being planned in such a manner that shipping will not be interrupted. The whole change, it is stated, has been necessitated by expansion in business.

## Silver Company Profits at Record

Net profits of the International Silver Company for 1927 are as reported, $1,857,854 after all charges, which is a new high record for the company. It compares with $1,470,647 earned in 1926, making a gain of 26 per cent for the year. Earnings last year were equal to $17.25 a share.

## New Jersey Zinc Income Steady

Net income of the New Jersey Zinc Company for the year 1927 amounted to $7,038,769 after depreciation, depletion, interest, Federal taxes and other charges. This compares with $7,039,35 earned in 1926.

## Summary of Spray Coating Study

Final report on a study of the hazards of spray coating has been issued by the National Safety Council, Chicago, Ill., a special committee of which made the investigation and prepared the 53-page summary. It is stated therein that, briefly, it is safe in indoor work to spray materials which contain quantities of lead (more than 2 per cent) or of benzol (over 1 per cent) or free silica, if the worker is protected by (1) adequate ventilation which produces an exhaust of 200 linear feet per minute; (2) an efficient mask or respirator of the positive pressure type. It is recommended that wherever practicable, materials free from lead, benzol and free silica be used.

## Statue of Liberty to Be Cleaned

The immense bronze Statue of Liberty, which has been standing in New York harbor for the past 41 years, is to be cleaned for the first time, according to an order issued by the United States War Department. It had been the general belief that perpetual salt spray and heavy rain would keep the statue clean, but a great deal of dirt has collected on it nevertheless, due to smoke and dust. Cleaning will be done by application of soap in the form of small beads through a hose, under pressure, after which water will be applied. In this manner it is expected that the natural weather-green bronze color will not be affected.

## World Silver Output Lower

Countries which in 1926 produced 88 per cent of the world's total silver output, showed a total production of 219,604,000 fine ounces for 1927 as compared with 221,062,000 in 1926.

## American Metal Earnings

The net income of the American Metal Company, Ltd., New York, for the year 1927 was $2,513,764, as compared with $2,657,309 in 1926.

## 300-Year-Old Cuban Bell Found

A large bronze bell, cast over 300 years ago at Barcelona, Spain, and later used in Cuba in ecclesiastic and military ceremonials, has been found in New York City and will probably be returned to Cuba, where it is considered with somewhat the same sentiment as Americans have toward the Liberty Bell. The Cuban bell was brought here in 1899 by American soldiers who had been in Cuba during the Spanish-American War, and who installed it in the armory of the 212th Regiment, New York National Guard. The Cuban authorities have for some time been greatly desirous of retrieving the bell.

## Babbitt-Metal Consumption Gains

The total apparent consumption of Babbitt metal in January, 1928, based on reports received by the Department of Commerce from 31 firms, was 4,928,517 pounds as compared with 4,465,787 in December, 1927, and 5,439,689 in January, 1927. This consumption is calculated from sales by manufacturers and consumption by those firms (among them several important railroad systems) which regularly consume their own production of Babbitt metal.

## Incorporations

**Eckfeldt & Ackley, Inc.,** 102 Murray Street, New York, has been organized to manufacture and deal in jewelry, with capital of $250,000.

**Oakes-Swenson Company** was formed the first of this year and is located at 1470 East Nineteenth Street, Indianapolis, Indiana. James L. Gavin is president; Addison J. Parry, vice-president; C. G. Swenson, secretary; and Parry Oakes is treasurer. The men forming this organization were all formerly officers of the Oakes Company of Indianapolis and have had many years' experience in the metal stamping work. The Oakes-Swenson Company not only handles production work but also specializes in difficult drawing.

# Business Reports of The Metal Industry Correspondents

## New England States

### Waterbury, Conn.

AMERICAN BRASS OFFICIALS REELECTED

MARCH 1, 1928.

All last year's officers and directors of the **American Brass Company** were reelected at the annual meeting last month. They are: President, **John A. Coe;** executive vice-president, **Edward L. Frisbie;** treasurer, **Clifford F. Hollister;** assistant treasurer, **Major W. Judge;** assistant treasurer, **S. Burnham Terry;** secretary, **Edmund H. Yates;** directors: John D. Ryan, Cornelius F. Kelley, John A. Coe, Benjamin B. Thayer, Edward L. Frisbie, Clifford F. Hollister, Edmund H. Yates and Clark S. Judd.

SCOVILL MANUFACTURING COMPANY

Regular quarterly dividend of 60 cents a share was declared on the stock of the **Scoville Manufacturing Company** last month, payable April 1. The officers and directors were re-elected as follows: President, **E. O. Goss;** vice-presidents, **John A. Goss, George A. Goss** and **Bennet Bronson;** treasurer, **Clayton M. DeMott;** secretary, **Leavenworth P. Sperry;** assistant treasurers, **F. J. Gorse, William M. Goss;** assistant secretaries, **T. B. Myers, B. P. Hyde, C. F. Doherty and W. W. Bowers;** directors: E. O. Goss, John H. Goss, C. M. DeMott, L. P. Sperry, C. P. Goss, Jr., W. S. Fulton, George A. Goss, Roger S. Sperry, John P. Elton, Bennet Bronson and W. M. Goss. **Scovill Manufacturing Company's** financial report for the year ended December 31, 1927 shows a net profit for the year of $2,522,250, which is slightly less than the dividends paid during year. The surplus shown is $4,350,507 as compared to $4,583,170 the previous year. Its net operating income was $5,221,948 and its gross profit from operations, $2,531,032. Total assets are given at $33,778,698. In addition to the item of surplus mentioned there is also an item of reserve amounting to $6,188,031.

CHASE BRASS AND COPPER

Last year's officers and directors of the Chase Brass and Copper Company, Inc., selling subsidiary of the Chase Companies, Inc., were re-elected at the annual meeting held last month, as follows: President, **Frederick S. Chase;** vice presidents, **Robert L. Coe, J. R. Van Brunt,** C. **H. Krueger;** treasurer, **Richard D. Ely;** secretary, **Charles E. Hart;** assistant secretary, **George C. St. John;** assistant secretary, **Rodney Chase;** controller, **W. A. Purdy;** assistant controller, **E. H. Madison;** directors: F. S. Chase, R. L. Coe, J. R. Van Brunt, C. H. Krueger and R. D. Ely.

**Beardsley Manufacturing Company's** stockholders have voted to acquire the property and business of the **Frank E. Wolcott Manufacturing Company** of Hartford, at a sum said to be in the neighborhood of $500,000. The local concern is capitalized at a similar amount and to finance the purchase, a new company, **The Beardsley and Wolcott Manufacturing Company** is to be formed and capitalized at $1,000,000. Stock of both the old companies will be exchanged share for share for the stock of the new company. The local company occupies the plant of the former **Novelty Manufacturing Company,** and manufactures small brass and nickel articles. **Charles E. Beardsley,** president of the **Beardsley Manufacturing Company,** will be president of the new company. At one time he was general manager of one of the local **American Brass** plants. With associates he acquired the **Novelty Manufacturing Company** and consolidated it with the **Risdon Manufacturing Company,** of Naugatuck, of which he also became president. About a year ago he formed the **Beardsley Manufacturing Company** to take over the plant of the **Novelty Manufacturing Company** from the **Risdon Company. Mr. Beardsley** has just been elected president of the **Bridgeport Brass Company. Frank E. Wolcott,** head of the Hartford company, has been engaged in the electrical manufacturing field since 1907.

He established the **Frank E. Wolcott Manufacturing Company** in 1922 and manufactures electric curling irons, and various other electrical appliances. **Mr. Wolcott** will be vice president of the new concern and **Rowley W. Phillips,** now secretary of the **Beardsley Company,** will be secretary. The directors will be: **Mr. Beardsley, Mr. Phillips, Mr. Wolcott, Elton S. Wayland,** former vice president of the **American Brass Company; Henry W. Adams,** now treasurer of the **Hoffman Specialty Company; George T. Wigmore, Irving W. Day,** and **William S. Fulton,** president of the **Waterbury Farrell Foundry.**

**The American Fastener Company** of Maple Street has started a four story addition to its present plant. The addition will be 40 x 135 feet, as compared to the main plant which is 40 x 98 and will have 27,000 feet of floor space compared to 16,000 feet in the main plant. The addition will cost $75,000 and will be utilized almost exclusively for the manufacture of hose supporter trimmings. At least 100 additional employes will be engaged. **Max Kiessling** is president and **John Draher** is treasurer of the company.

**John Schuster** was elected president of the **Waterbury Farrell Foundry Veterans' Association** last month. The association has 124 members who have worked for the company over 20 years. Six new members were admitted last month. Among its members are the following officials of the company: President W. S. Fulton; Vice President D. C. Griggs; Secretary F. L. Squires. Some of the members have been in the company's employ for as much as 57 years.

E. O. Goss, president of the **Scovill Manufacturing Company,** is rapidly recovering from an operation for acute appendicitis performed last month. On January 27 Mr. Goss completed 40 years' service with the company, having entered it as a draftsman and passing through the offices of assistant treasurer, treasurer, general manager and vice president before becoming president.

**The Chase Companies, Inc.,** have adopted the 9-hour day for all their plants. Officials state that it is not a temporary arrangement and has no bearing on business conditions or orders received but is a permanent arrangement and is due to the decision that a 10-hour day is too long for their employes. There is no slackening of business nor is any expected, they say. **The American Brass Company** and the **Scovill Manufacturing Company** are officially on a 10-hour basis, although some departments are working only 9 hours. Officials of those companies state that the trend with them is for a full 10-hour day.

**Dr. Frank Crane, Jr.,** of Malden, Mass., was the principal speaker at the annual dinner of the **Chase Companies Foremen's Association,** held last month. **Frederick S. Chase,** president of the company, was the toastmaster. Other speakers were **G. C. St. John** and **J. R. Van Brunt,** of New York, vice presidents of the **Chase Brass and Copper Company.**

Among the speakers at the annual banquet of the **Scovill Manufacturing Company's Foremen's Association,** held last month, were **E. O. Goss,** president of the company, **Mayor Francis P. Guilfoile, Rev. R. J. Clabby, Rev. M. W. Owen, Edward H. Davis** and **Hiram L. Webb.** Over 600 were present.

The city's industrial exhibit, showing thousands of the articles manufactured in Waterbury, which has been housed in the Chamber of Commerce Hall, is to be installed in the railroad station on invitation of the New Haven road. The exhibit won high praise when displayed at an industrial exposition in New York two years ago.—W. R. B.

## Bridgeport, Conn.

MARCH 1, 1928.

About 20 local exhibits and 20 out-of-town exhibits were shown at the first cooperative exposition of the **Salesmen's** and **Purchasing Agents' Association** of this city held in the Mosque February 24 and 25, 1928. The association was formed to bring local salesmen and purchasing agents together but this year for the first time it was decided to hold an exhibition and invite out-of-town exhibits. Hardware and mill supplies were the principal articles shown, together with mechanical scissors, gears, belt wheels and belting, pulleys, grinding wheels, files, plumbs, dies, countersinks, taps, wrenches of all kinds, lathe tools, electric sanding machines, printing presses and press feeders, brass fittings, auto accessories, plumbing fixtures, electric motors, switch breakers and lighting fixtures. The exhibition was arranged by the officers of the association: President, **H. J. Behn;** vice president, **A. H. Jones;** secretary, **Walter B. Osborne;** treasurer, **R. T. Phipps. The Manufacturers' Association** cooperated in holding the exhibit. The idea was to give the purchasing agents a chance to view the latest devices put out by local and nearby factories.

Over 40 employes of the **Jenkins Brothers Company,** valve manufacturers, all employed for more than 25 years, attended the fifth annual banquet of the **Jenkins Veterans' League** at the Hotel Stratfield, on February 10. Several have been employed over 40 years. Addresses were made by **Farnham Yardley,** president of the company; **Frank T. Swain,** vice president; **C. V. Barrington,** vice president; and **B. J. Lee,** manager.

The largest accumulation of orders since the war is reported at the **Bullard Machine Tool Company** by **President E. P. Bullard, Jr.,** who says that approximately 300 additional workmen will have to be engaged in the near future. The first group of new employes has already started and more will be added as soon as new equipment and raw materials arrive. Demands by automobile and airplane manufacturers are responsible. **Ford Motor Company** and **General Motors** are among the customers and orders have also been received from the **Wright** people for their **Whirlwind** motors and from **Pratt and Whitney** for their **Wasp motors.**

**Warren Blatz** of the **Bridgeport Brass Company** was elected president of the **Sales Managers' Association** at its annual dinner last month. **R. W. Bowdoin,** head of the research department of the New England council, denied reports that New England's leadership in industry is passing. A survey conducted by the council shows that while during the last year 207 factories moved out, 413 moved in, and while 13,000 factory workers left New England, 19,000 came in. Adverse propaganda has caused the trouble, he said, declaring that the greatest difficulty in Vermont today is not the actual flood damage but the impression spread throughout the country that because of the flood Vermont factories could not deliver goods.—W. R. B.

## Connecticut Notes

MARCH 1, 1928.

**NEW BRITAIN**—Net profits of the **American Hardware Corporation** for the year 1927 were $2,510,381 after deducting depreciation charges and reserve adjustments. Dividends during the year amounted to $2,480,000 and $30,361 was added to the surplus account making it $3,040,487 as of January 1, 1928. Total assets are reported to be $17,181,148 as compared with $16,748,191 a year ago. The company charged off $368,826 for depreciation during the year. The annual meeting and election of officers and directors was held February 29, 1928.

The stockholders of the **Stanley Works** have voted to sell the company's holdings in Bridgewater, Mass., where a hot rolling mill was formerly operated. The equipment has been transferred to the plant of the **American Tube and Stamping Company,** Bridgeport, now owned by the **Stanley Works.** Officers of the **Stanley Works** elected last month are: Chairman of the board of directors, **E. A. Moore;** president, **D. F. Bennett;** vice presidents, **Walter H. Hart, P. B. Stanley, J. E. Cooper, E. W. Christ, Malcolm Farmer, J. E. Stone;** treasurer, **W. Young;** secretary, **E. W. Christ;** assistant treasurers, **J. B. Wilbur, Jr., R. F. Pritchard;** assistant secretaries, **P. F. King, M. H. Pease.** The company's financial report for 1927 showed net earnings after deductions, of $1,466,942 and a surplus on January 1, 1928 of $4,113,862. Total assets were listed at over $19,000,000. The regular quarterly dividends of 2½% on common and 1¼% on preferred were declared.

Stockholders of the **New Britain Machine Company** last month elected the following directors: **L. P. Broadhurst, E. M. Day, J. H. Goss of Waterbury, H. H. Pease, P. K. Rogers, W. S. Rowland, P. B. Stanley, F. G. Vibberts, R. S. Brown.**

**TORRINGTON—Christian G. Hoerle,** aged 67, for 27 years superintendent of the Union Hardware Company, died at his home on Migeon Avenue on February 20, 1928. He was associated with hardware manufacturing ever since 1879 when he became superintendent of the **Hammacher-Schlemmer**

hardware factory in New York. He was later superintendent of the **Holmes, Booth and Hayden Company** of Waterbury for eight years, coming to Torrington in 1891. During his latter years with the **Union Hardware Company** he was its secretary as well as superintendent, retiring about two years ago. He was on the staff of **Gov. C. A. Templeton** in 1923-1924. He is survived by his wife; two daughters, two sons, William F. and Christian K. Hoerle, three grandchildren and a brother.

**John A. Coe**, president of the **American Brass Company**, was the principal speaker at the annual banquet of the factory foremen of all Torrington factories at the Y. M. C. A. last week. He spoke on **Industry As It Was and Is. Frank J. Damon**, vice president of the **Union Hardware Company**, spoke on **Recreation and Industry.** The banquet was conducted under the auspices of the **Industrial Recreational Council**, representing all the factories, the members being as follows: **Irving Mills, William H. Graham** and **Charles Brimble** of the **American Brass Company; James Kelley** and **John Brown** of the **Union Hardware Company; Andrew York** and **Earl Northrop** of the **Hendey Machine Company; Edward Didier** and **Ernest Novey** of the **Torrington Company; Sal Rubino** and **Henry Rollett** of the **Torrington Manufacturing Company; William F. Krause** and **Owen Canfield** of the **Fitzgerald Manufacturing Company.**

Officers of the **Hendey Machine Company** were elected last month as follows: President, **John A. Coe** of Waterbury; vice president and treasurer, **Sterry H. Childs** of Litchfield; secretary, **Frederick H. McKenzie**; directors, **C. H. Alvord, S. H. Childs, John A. Coe, F. W. Fuessenich, W. Shirley Fulton** of Waterbury, and **Charles S. Palmer.**

**BRISTOL**—Officers and directors of the **American Silver Company** were elected last month as follows: President and treasurer, **Alexander Harper**; vice president, **Dean Welch**; secretary, **G. W. Merriman**; assistant treasurer, **John J. Kaycher**; directors, **Julian R. Holley, Charles T. Treadway, Alexander Harper, W. S. Ingraham, Pierce M. Welch, Dean Welch, F. S. Champion, George W. Merriman, Fuller F. Barnes** and **Morton C. Treadway.** The company reported a surplus as of December 31, 1927, of $195,802 as compared with $190,385 a year ago.

Stockholders of the **Bristol Brass Corporation** at its annual meeting last month re-elected its former directors as follows: **Julian R. Holley, William S. Ingraham, Dean Welch, Pierce N. Welch, Albert D. Wilson, Harold K. English, Roy T. H. Barner, Charles T. Treadway, Alexander Harper, Frederick S. Chamberlin, Fuller F. Barnes, William K. Sessions, Edward Ingraham, Townsend G. Treadway.** The directors re-elected the former officers as follows: President, **Alexander Harper**; vice president, **Julian R. Holley**; secretary and treasurer, **Albert D. Wilson**; cashier, **Carl A. Gustafson**; works superintendent, **John H. Vickers. Bristol Brass** finished the year with a surplus of $364,309 as compared with $280,849 a year ago. During the year $10,850 was paid out in dividends on the preferred stock and $20,000 was added to the contingency reserve. Net earnings during the year amounted to $114,310. Total assets are now $2,847,164.

Grand list valuations on which taxes for this year will be levied give the following concerns as the highest taxpayers, valuations being as follows: **New Departure Company**, $8,269,000; **E. Ingraham Company**, $1,837,000; **Bristol Brass Company**, $1,500,000; **Wallace Barnes Company**, $1,562,500; the **Sessions Clock Company**, the **Sessions Foundry** and the **American Silver Company** are assessed for more than $500,000 each.

**MERIDEN—The International Silver Company's** stockholders have voted to increase the common stock of the company from 60,798 shares to 91,197 shares. The stockholders will be allowed to subscribe to the new stock at $110 a share on the basis of one-half share for each share now held. The stock is now selling at $185 and rights to purchase additional stock are being sold at $25. The increase will be used to retire the bonded indebtedness amounting to around $2,427,000. The company will then have no bonded debt and capital stock of $6,607,500 preferred and $9,119,700 common. While the financial statement for 1927 has not been made public, it is said that it will show earnings comparable to those of 1926, when a net of $1,470,647 or $17.24 per share was shown after taxes, depreciation and interest. The earnings during the first nine months of last year amounted to $10.95 a share after all charges. It had a surplus at the end of 1926 of $4,362,755 and a working capital of more than 15 times the current liabilities.

**The Sterling Electric Clock Company** last month elected as its president **Edward Noble**, president of the **Life Savers Corporation.** It has acquired the plant of the former **Parker Clock Company. Lewis J. Stern**, Philadelphia inventor, has been elected vice-president.

**TERRYVILLE**—The polishing department of the **Eagle Lock Company**, which has been on a 10-hour-a-day schedule, five and one-half days a week, has gone on a schedule of eight hours a day, five days a week. All departments except the shipping room, machine shop and a few sections of other departments are now operating on the new schedule, the two mentioned alone keeping on a 10-hour-a-day, five and one-half days a week schedule.

**HARTFORD—The Hartford Machine Screw Company** and the **Standard Screw Company** will hold their annual meetings on March 28, 1928.

**Pratt and Whitney Company** has received contracts from the **United States Navy** for 96 additional **Hornet** and 50 additional **Wasp** motors for seaplanes. The company in the past few months has received Navy contracts totalling nearly $6,000,000. This company, in conjunction with the **Boeing Aircraft Company** is sending **Capt. Ralph O'Neil** in a plane equipped with a **Pratt and Whitney** engine on a three months' tour of all the South and Central American republics.

**NAUGATUCK—The Concannon Shears Company**, organized by **William F. Concannon**, a former resident, and now doing business in Bridgeport, has leased the factory in Millville, a local suburb. The factory was formerly used by the **Naugatuck Engineering and Machine Company.** The officers of the company are: President, **William F. Concannon**; secretary, **Peter Concannon**; treasurer, **John B. Dillon** of Shelton. It has a capital stock of $50,000.

**The Eastern Malleable Iron Works** has added **Nelson S. Spencer** of New York, **E. L. Whittemore** of Cleveland, **Charles E. Spencer** of Boston, **Donald S. Tuttle** of Naugatuck, and **Austin L. Adams** of Naugatuck to its board of directors.

The estate of **Harris Whittemore**, former head of the Eastern Malleable Iron Works totals $6,161,992. Among his holdings were $420,000 **National Malleable Iron Company**; $420,000 **Eastern Malleable Iron Company**; $704,000 **J. H. Whittemore Company**, which held stock in the two concerns mentioned; $294,000 **Landers, Frary and Clark**; $78,000 **American Hardware**; $56,250 **Anaconda Copper Mining Company.**

**BANTAM—The Bantam Ball Bearing Company**, one of the best known industries in Litchfield county, is to move to South Bend, Ind., and the factory here will be sold. The company is capitalized at $250,000. **W. S. Rogers** is president and principal stockholder. Contracts have been let for the building of a factory in South Bend, 100 x 210 feet, with two additional units of 70 x 210 feet on each side. The local factory now employs 100 hands.—W. R. B.

## Providence, R. I.

MARCH 1, 1928.

Weather conditions have proven especially favorable the past month for a continuance of business activities in practically all lines of metal work and there are increasing evidences that there will be a more substantial improvement during the coming months. Never in the history of Providence have there been as many building projects under way or in contemplation as at present. These activities are being reflected in the small tool and accessories lines. Among the manufacturing jewelry trades there is likewise occasion for optimism; not merely theoretically but practically. It is a long time since there have been so many persons employed in the local jewelry plants.

**The Quality Manufacturing Company**, to be located in Pawtucket and manufacture sheet metal products, has been incorporated in Rhode Island with authorized capital of 500 shares of common stock of no par value. The incorporators are **Alfred M. Bonin**, 105 School Street, Central Falls; and **Laurence J. Hogan** and **Edward T. Hagan** of Providence.

**William A. Viall**, vice president of **The Brown and Sharpe Manufacturing Company**, spoke to more than 100 members of the Providence Rotary Club at a recent luncheon at the Prov-

idence-Biltmore Hotel telling of the prominent place Providence occupies in the manufacture of instruments and fine tools. His talk was the second of a series which was inaugurated by the club a month ago, when **Edmond C. Mayo,** president of the **Gorham Manufacturing Company,** was the speaker. Mr. Viall traced the history of the concern he represents from its inception nearly a century ago in a little shop down on South Main Street to the present plant covering 32 acres of floor space and employing at present, although on a reduced schedule, about 3,800 persons. He said that **Brown and Sharpe** goods are to be found in every part of the world and the variety of tools made at the Promenade Street plant, together with other work done there, exceeds 10,000 separate pieces.

**The James H. O'Neil Company** has been incorporated in Rhode Island to conduct a manufacturing jewelry business in Providence, with authorized capital of 150 shares of common stock of no par value. The incorporators are **James H. O'Neil, Timothy E. O'Neil** and **Francis G. Fentneau.**

**The James F. Donovan, Inc.,** is the style of a concern recently incorporated in Rhode Island for the purpose of manufacturing metal products in Providence, with an authorized capital stock of $50,000 consisting of 500 shares of common stock at $100 each. The incorporators are **James F. Donovan, William M. J. Craig** and **John J. Cooney,** all of Providence.

**The Art Metal Corporation** of Providence has been incorporated to deal in metal products. The capital stock is $25,000 consisting of 250 shares of preferred stock at $100 a share and 50 shares of common stock without par value. The incorporators are **Nathan Ball, Rebecca Ball** and **Philip Fiegar,** all of Providence.

**The Bourbon Aircraft Corporation,** to be located at Warwick, R. I., has been incorporated with a capital stock of 500 shares of common without par value. The incorporators are **Allen P. Burden** of East Greenwich and **Charles L. Allen, Clifford B. Thompson, Harold T. Dennison** and **Harry P. Cross,** all of Providence.

**The D and M Jewelry Casting Company,** 212 Union Street, Providence, is owned and conducted by **Charles E. Dansereux,** 697 Killingly Street, Johnston, R. I., and **Samuel Mautaquila,** 66 Pengrove Avenue, Cranston, R. I., according to their statements on file at the city clerk's office.

**Gorham Manufacturing Company** has designed and is executing a handsome bronze tablet at its bronze foundry at Elmwood for the St. Jean Baptiste Church at Maplewood, Mass. The tablet, which will cost approximately $900 is to be delivered in April. It is four feet in length and three feet in width and will bear a bas-relief of a former pastor, Rev. Joseph H. Norbert Blanchet, in whose memory it is being erected.

**Brier Manufacturing Company,** jewelry manufacturers, are erecting a new factory building on Richmond, Ship and Tippecanoe Streets, to cost $70,000. It will be fully equipped with modern machinery and apparatus in its various departments, including coloring, lacquering, polishing, japanning, stamping, soldering, tinning as well as tool room, die cutting and other divisions. They expect to move from their present plant at 70 Ship Street to the new quarters early in the Fall.

**The P and S Polishing and Plating Company,** 220 Eddy Street, Providence, is being conducted by **James A. Simpson** of Lakewood, R. I., and **Max A. Peisach** of this city, according to their statement filed at the office of the city clerk.

**Edmond C. Mayo,** president and general manager of the **Gorham Manufacturing Company,** at the recent luncheon meeting of the Providence Rotary Club held at the Providence-Biltmore Hotel, gave an illustrated lecture on **Fine Arts in Metals.** This was the first of a series of manufacture talks and proved very interesting and instructive. After telling the history of the **Gorham Manufacturing Company,** Mr. Mayo showed moving pictures of scenes at the Elmwood plant of the concern.

**Krasner and Company, Inc.,** which will deal in jewelry and novelties, and have headquarters in Providence, with an authorized capital consisting of 500 shares of no par common stock, has received a charter under the laws of Rhode Island. The incorporators are **Maurice Robinson, Charles M. Robinson** and **Aaron Krasner,** all of Providence.

At the annual meeting of the stockholders of the **Nicholson File Company** on February 8, 1928, **President Samuel M. Nicholson** read his annual report covering the activities of the company for the year 1927 in which he reviewed the business conditions of the country during the year, with particular emphasis on their relations to the file industry. The following directors were elected for the ensuing year: **Samuel M. Nicholson, Paul C. Nicholson, Marsden J. Perry, John Russell Gladding, Byron S. Watson, Ernest S. Craig** and **Augustus E. Saunders.** At a subsequent meeting of the board of directors, the following officers were elected: President and general manager, **Samuel M. Nicholson;** vice president and treasurer, **Paul C. Nicholson;** secretary and assistant general manager, **Ernest S. Craig;** assistant treasurer and cashier, **Henry W. Harman;** assistant treasurer, **Albert J. Dana;** assistant secretary and manager of credits, **Augustus E. Saunders;** domestic sales manager, **Wallace L. Pond;** foreign sales manager, **S. Foster Hunt;** assistant to the president, **Robert W. Hathaway.**—W. H. M.

# Middle Atlantic States

## Newark, N. J.

MARCH 1, 1928.

A voluntary petition in bankruptcy has been filed in the United States District Court here by **Malone-Lemmon Products, Inc.,** radio manufacturers, of 130 Waynewood Park, Plainfield, N. J. **Ralph J. Smalley** of Plainfield was appointed receiver. The liabilities were listed as $60,000 and the assets at $40,000. It is said that a plan for reorganization is under way.

**Federal Judge Bodine** handed down a decree restraining the **Continental Lamp Company** of Newark, from continuing manufacture of an incandescent lamp embodying features said to be patented by the **General Electric Company.** The decision ends a suit which was instituted in the United States District Court some time ago by the General Electric.

Newark concerns just incorporated are as follows: **Acme Bar Manufacturing Company,** $50,000; electrical equipment. **Warren Sheet Metal Works, Inc.,** $100,000; manufacture metal doors. **Ronald and Company,** 1,000 shares; manufacture cutlery. **Eckfelt and Ackley, Inc.,** $250,000; manufacture jewelry. **Paramount Manufacturing Company,** $50,000; manufacture electrical devices. **Cleary and Wiener, Inc.,** $125,000; precious metals. **Hedwig Manufacturing Company,** $20,000; manufacture hardware.

Fire recently destroyed the tube mill plant of the **British-American Metals Company,** at Plainfield. Damage to the factory, which has been used in the manufacture of brass and copper tubing, has been estimated at $500,000. Two hundred employes have been thrown out of employment. The company's power plant was also damaged. The plant will be rebuilt.—C. A. L.

## Trenton, N. J.

MARCH 1, 1928.

**John A. Roebling's Sons Company** will shortly begin the erection of a new rod mill to cost about $750,000. The structure will be located between the present rod mill and the steel mill. It will be approximately 350 x 85 feet, according to **William A. Anderson,** vice president and treasurer of the concern. The new building will be one story in height. The rod mill is to reduce two-inch billets to smaller sizes by a roller process. Officials of the Roebling company are working out the details for the new structure. The contract for the mill machinery has been given to the **Morgan Construction Company,** Worcester, Mass. Numerous contracts covering other phases of the construction remain to be assigned. The present rod mill has been in use for twenty-three years. The Roebling company has just completed an office building at a cost of

$300,000. Materials for the new **Fort Lee Bridge** over the Hudson River between New York and New Jersey, which make a contract totaling $12,000,000, are now being manufactured. However, the firm has until 1932 to complete its contract and the production end will be carried along without any noticeable departure from established routine. Other contracts are being handled along with the bridge job.

**Jordan L. Mott Company,** which was recently purchased at receiver's sale by the **Laib Pottery Company,** of Louisville, Ky., is not running to capacity as was expected when the plant changed hands recently. The brass department is running five days a week, but the other departments have but few hands working. The new company hopes to see better working conditions by early spring.

**William G. Wherry,** president of the **Skillman Hardware Manufacturing Company,** has been elected head of the **National Builders' Hardware Trade Association.** The election of **Mr. Wherry** to head this association, the largest of its kind in the country, took place at a meeting in New York City.

The following concerns have been incorporated here: **Gordon Automatic Tool Corporation,** West New York, $200,000 preferred and 8,000 shares common no par; manufacture tools. **Accurate Engineering and Manufacturing Company,** Passaic, $100,000; manufacture electrical machinery. **Electric Fixture Company,** Westwood, $125,000; electrical equipment. **Formzone Chemical Company,** Trenton, fifteen shares no par; manufacture chemicals. **Paterson Welding Company,** Paterson, $50,000; welding. **Vineland N-S-E Corporation,** Vineland, $50,000; manufacture fuel saving devices. **Quickpin Piston Company,** Ridgefield, $125,000; manufacture piston rings. **Atlan Welding Company,** Hoboken, $10,000, deal in welding machinery.—C. A. L.

# Middle Western States

## Detroit, Mich.

MARCH 1, 1928.

According to its annual report, **The Kalamazoo Stove Company,** Kalamazoo, Mich., enjoyed the most prosperous period in its history during 1927. Net profits and sales volume were the greatest it has had in the last 27 years. Net profits after all taxes and depreciation were $588,527, equal to $11.77 per share on the 50,000 shares. The company has no bonds, no preferred stock and no bank loans. Inventories are declared to be extremely low. The ratio of current assets to current liabilities at the close of the year were 7.73 to one, compared with 6.51 to one for the year ending December 31, 1926.

The **Detroit Gray Iron Company, Detroit,** expects before long to start on the erection of an addition to its present factory.

**Glendon R. Roberts,** formerly with the **Roberts Brass Manufacturing Company,** Detroit, has been elected secretary-treasurer of the **Detroit Stamping Company.**

Termination of negotiations for the merger of the **Bohn Aluminum and Brass Company** and the **Michigan Smelting and Refining Company,** both of Detroit, at least for the time being, has been announced by officials of the Bohn Co. The **Bohn Aluminum and Brass Company** has obtained a contract to supply the **Chevrolet** division of the **General Motors** with Nelson-Bohnalite aluminum pistons during 1928. The contract is one of the largest of the kind on record, in view of the fact that the **Chevrolet** organization plans a production in excess of 1,000,000 motor cars and trucks during 1928. Recent plant additions and expanded manufacturing facilities give the **Bohn** organization capacity for 8,000 pistons a day. In addition to the piston business, the company manufactures Bohnalite, an aluminum alloy, and brass castings, as well as bronze-back babbitt bearings, gears and bushings. These products are widely used, not only by automobile manufacturers, but by vacuum cleaner and other household utility manufacturers. Another expanding field for the company's activities is the manufacture of bearings for airplane engines. Along with the **Chevrolet,** the **Ford Motor Company** and some 40 other motor car manufacturing companies are using aluminum pistons this year. Much of this business is going to the **Bohn** company.

Officials of the **Campbell, Wyant and Cannon Foundry Company** at Muskegon Heights, Mich., announce that all of their plants have been placed upon a 100 per cent production basis. Releases on orders, some of them accompanied by urgent shipping demands, were responsible for the change in activity. The increase in production means the employment of between 300 and 400 men and the resumption of six-day working schedules.

The **Ireland and Matthews Manufacturing Company,** Detroit, has increased its capital stock from $1,500,000 to $1,560,000.

Some improvement is reported in the demand for nonferrous scrap metal in this territory. **General Motors** and other motor car organizations are now increasing their tonnage demands to some extent. Aluminum scrap is a little more active as a result of large orders being received for crank cases. Prices have not yet been affected as there is a large supply of metal to meet all demands.

Dr. **Max Otto Wurmbach,** of Munich, Germany, one of the best known metallurgists of Germany, paid a visit to Detroit recently. "My visit to the United States," he said, "is to investigate the advancement that has been made here in the methods of extracting and manufacturing aluminum and its alloys. The belief among metallurgists is pretty well established that in perfecting this metal, in arriving at a greater technique in its manipulation, in discovering new and more adaptable alloys, lies a great field for laboratory and practical work. The two countries that produce and use the most aluminum are the United States and Germany. But its production is too expensive. With the greater development of hydro-electric plants, however, this should be reduced."

**The Mueller Brass Company** at Port Huron, is an interesting example of the modern tendency of manufacturers to encourage thrift and systematic saving among employes. One of the provisions of this company is that all employes who have been in the service for one year at the time the plan went into effect will receive as a gift for loyalty, one share of 7 per cent cumulative preferred stock. The company also offers to each employe who qualifies as to service the right to buy additional stock in amounts not to exceed 10 per cent of his annual earnings, exclusive of bonus payments. The company will deposit each year from 1929 to 1933 inclusive a percentage of its profits in the form of a trust fund which will be distributed pro rata in January, 1933, to all employe stockholders who have remained in continuous employ of the company and who are at the date of the disbursement still in possession of their stock. The company agrees to repurchase at par value upon ten days notice any stock thus sold, previous to the division of the participating trust fund. Suitable provision will be made to protect employes' stock investments in the event of temporary unemployment, sickness or death. The stock that is being sold under this plan is preferred and cumulative, having preference over all other classes of the company's stock with respect to assets and dividends.

The **Detroit Free Press** recently printed the following in its "Know Your Detroit" column:

Detroit produces a greater tonnage of aluminum alloys than any other city in the world. This younger branch of the foundry industry, like the manufacture of brass, is strongly intrenched in Detroit because of the important part it plays in the production of machinery. Recent research by chemists has produced aluminum alloy so hard, strong and ductible it can be used to replace steel. Aluminum is used almost entirely where a reduction in weight in the metal used is desired. Among the important castings of the alloy made in Detroit are parts for automobiles, washing machines and vacuum cleaners. Although but recently introduced in industry, aluminum rapidly was adopted by automobile manufacturers in the making of pistons, axle-housing and other parts where its peculiar qualities are indispensable.

Funeral services for **Charles H. Woodison,** vice-president of the **E. J. Woodison Company,** manufacturer of foundry supplies and vice-president of the **Canadian Foundry Supply and Equipment Company,** of Toronto and Montreal, were held in Detroit during the latter part of January. He was 50 years old and had been ill for about three weeks. **Mr. Woodison** was born in Windsor, Ont., but passed most of his life in Detroit.—F. J. H.

## Toledo, O.

MARCH 1, 1928.

Activity in the non-ferrous metal field is beginning to increase as the large manufacturing plants in this territory continue to expand production. This city and its suburbs have been more favored from a manufacturing standpoint during the winter months than most others in the mid-western territory, this being particularly true along the great lakes. Conditions are growing more favorable each week and there is every indication that the spring and summer will be favorable to all lines of industry in Toledo and suburbs.

**O. P. Kilbourn,** assistant general sales manager of the **Willys-Overland Company,** reports exceptional activity in his plan. "We have passed the thousand mark in our daily production," he says, "and are running well above this point at the present time. Our factory schedule, originally set for 25,000 cars, is certain to be exceeded, and the figure for March has been set at 40,000."—F. J. H.

## Cleveland, O.

MARCH 1, 1928.

Even at this early date, manufacturing conditions in this territory are beginning to show the effects of approaching spring. Production in practically all the non-ferous metal plants is on the increase. This is due largely to demands from the motor car field. With the plants in Detroit now getting into heavier operations, Cleveland concerns furnishing parts, particularly in the brass, copper and aluminum field, are beginning to operate accordingly. General business conditions are on the upward trend and employment is showing an increase.—F. J. H.

## Chicago, Ill.

MARCH 1, 1928.

A meeting of the metal division of the **National Association of Waste Dealers** was held at the Hotel Sherman, Chicago, January 27, 1928, at which changes in the classifications of metals were discussed. Furtner corrections and classifications were made the following Tuesday at a meeting called by **George Birkenstein** of **S. Birkenstein & Sons,** at the Hotel Astor, New York.

**The Elgin Perfect Oil Burner Company,** Chicago, has dissolved, according to announcements made January 28.

The **Sheets-Rockford Silver Company,** Rockford, Ill., has completed plans for the erection of a factory addition which will cost approximately $10,000. The addition will be 63 x 119 feet and will have a steam heating plant.

Negotiations which have been under way for several weeks between the officials of the **United States Radiator Corporation** and the **Pacific Steel Boiler Company** of Waukegan, Ill., for the purchase of the latter company by the Radiator corporation, have been completed, according to a Detroit report. Further announcements were promised in the near future.

**F. C. Spencer,** of Oak Park, Ill., assistant superintendent of the manufacturing development at the Hawthorne works of the **Western Electric Company,** was appointed vice-chairman of the metal-cutting committee of the American Society of Mining and Metallurgical Engineers, at the annual meeting held recently.—A. P. N.

## Milwaukee, Wis.

MARCH 1, 1928.

Sawdust used in the tinning department of the **Manitowoc Plating Works,** Manitowoc, Wis., ignited and spread fire to all parts of the room almost instantly because of the benzine which is used in the cleaning process. The fire did not spread to other departments and the loss was confined to the one room by the prompt and effective work of the department, which, however, used nothing but chemicals in fighting the blaze. The loss is in excess of $4,000, damage being done to machinery, equipment and supplies. This was fully covered by insurance and the company will be discommoded only slightly as work was started immediately on repairs which will restore the department to normal.

**Walter J. Kohler** of Kohler, Wis., head of the vast industry that is known throughout the country as **Kohler of Kohler,** was selected as delegate at large to the coming **Republican Convention** at Kansas City. The **Kohler Company** is one of the largest makers of plumbing equipment.

Approximately 85 foundrymen from 60 plants in ten states held their second annual conference at the engineering building of the **University of Wisconsin** at Madison, Wis., from January 1 to February 3, 1928. The conference, which is under the administration of the Department of Mining and Metallurgy of the **Engineering College,** is in the form of a school at which the foundrymen teach each other in round table groups led by expert practicing foundrymen.

More than a quarter of a million dollars was added during 1927 to the group life insurance policy carried for its employes by the **Aluminum Goods Manufacturing Company,** of Manitowoc, Wis., according to **President George Vits.** This brings the total policy to $3,119,600.

Negotiations have been completed whereby the ownership of the property of the **Acme Brass and Metal Works,** Waupaca, Wis., passes into the hands of **J. E. Fuller** and associates, Rockford, Ill. The consideration, including patent rights in the **Jorgenson Primer Company,** totals approximately $60,000. The new owner plans to make some improvements in the plant and to reopen the nickel foundry which had been closed for some time. Some of the machinery used by both the Acme and Jorgensen people will be utilized, although more machinery will be installed. The company expects to manufacture meat processing machines.—A. P. N.

# Other Countries

## Birmingham, England

MARCH 1, 1928.

The non-ferrous tube makers of Birmingham continue busy, largely as the result of the shipbuilding demand; but the manufacture of tubes for domestic water conveyance is spreading, copper tubes being preferred as against lead for domestic water conveyance. The works producing brass stampings for a great variety of purposes are very well employed and the year has opened well.

The non-ferrous mills increased their price for strong copper products by £2 per ton at the end of January making the price £92. The rise was attributed to the higher price of metal. One of the busiest trades in Birmingham is the manufacture of ship lamps, which is one of the results of the revival of shipbuilding. Road lamps make a good second.

In the electroplating trade the year has opened very favorably in Birmingham but much business is gravitating to the big firms. Formerly it was very much a seasonal business but now the manufacturers lay their plans for an output of at least 85 per cent capacity throughout the year. Up-to-date firms report a steady improvement in the last five years and that the public taste is for high class goods rather than for those of inferior quality. There is an excellent demand for electroplated spoons and forks. Australia is a very good customer. It is considered that for cruet stands, salad bowls, etc., Canada is the best buyer. India takes a remarkably large number of silver tankards. Generally, in Sheffield also, the prospects of the electroplating trade are very good.

At a meeting of the **Birmingham University Metallurgical Society** held on January 24, **Professor Hanson,** in the course of his presidential address, gave a short account of the activities of the department. One of its functions is to train men for metallurgical control, the chief subjects dealt with being chemistry, physics and mathematics. If he has to work abroad, the student studies metal mining and geology and in the third year does metallurgy. The department is equipped with a special plant in which the students can work in quantities up to 20 or 30 pounds of metal, and special muffles are provided for the study of heat treatment. With the recent improvements he considers the facilities as good as in any university in the country.—J. H.

# Business Items—Verified

There was a final meeting of creditors of the **Electro-Sherardizing Company,** which is in bankruptcy, on February 27, 1928, at 1015 Chestnut street, Philadelphia, Pa.

**Mackintosh-Hemphill Company,** Pittsburgh, Pa., sustained damage of $150 by a trivial fire at its Midland, Pa., plant, on February 9, 1928. The company is engaged in engineering and building.

**Central Foundry Company,** Marshalltown, Iowa, was destroyed by fire on January 2, 1928, with estimated damage of $200,000. The company will not rebuild the plant as it is in liquidation.

**Meta-Mold Aluminum Company,** 129 Michigan Street, Milwaukee, Wis., is expected to prepare plans soon for a foundry building. As yet nothing has been decided upon, according to J. V. Watry, president.

**American Signs Corporation,** Kalamazoo, Mich., is having a complete porcelain enameling department installed, with an electric furnace. Work is being done by the Ferro Enamel Supply Company of Cleveland, Ohio.

**Monroe Brass and Wire Company,** Cincinnati, O., has been appointed representative in Cincinnati, Columbus, Springfield and Dayton, O., for the Fitzimmons Company, Youngstown, makers of cold drawn steel.

**Mt. Vernon Furnace and Foundry Company,** Mt. Vernon, Ill., is having a complete new porcelain enameling department installed. The Ferro Enamel Supply Company of Cleveland, Ohio, is making the installation.

**Johnson Bronze Company, New Castle, Pa.,** is to be operated from now on by P. J. Flaherty, president and general manager, who has acquired the Johnson interests in the firm. No changes in management or personnel are contemplated.

**Henry V. Walker Company,** manufacturers of enamels, lacquers, solutions, etc., 17 John street, New York, have removed their manufacturing operations from Jersey City and Belleville, N. J., to their new plant at Division street and Woodruff Lane, Elizabeth, N. J.

**Copper and Brass Research Association** has established a Pacific Coast office in the Architects Building, Los Angeles, Cal., with Timothy G. Turner as resident manager. The branch is said to have been necessitated by the increasing use of copper and brass west of the Rockies.

**Virden Company,** Cleveland, O., a division of the **Gill-Virden Company** which was formed last year by the merger of the Virden Company and the Gill Glass Company, is moving from Cleveland to a new plant just completed at Philadelphia. The firm makes lighting fixtures.

**Alois Aufrichtag Copper and Sheet Iron Manufacturing Company,** 900 South Third Street, St. Louis, Mo., is building a new one-story plant, 80 x 240 ft., with extension 30 x 100 ft. for toolroom and boiler house. Project is to cost upward of $60,000. No new equipment will be needed.

**Magnuson Products Corporation,** 55 Third Street, Brooklyn, N. Y., manufacturers of industrial cleaners, announce the opening of a new warehouse at the Indiana Terminal Warehouse Building, 230 South Pennsylvania Street, Indianapolis, Ind., where a large stock of Xcem products will henceforth be carried.

**Mesick & Mahy Manufacturing Company** has sold its property at 1341 South Wall street, Los Angeles, Calif., and has purchased a new plant at 247 East 23rd street, to which it has added a brick building containing about 4,000 sq. ft. of space. The company does electroplating and metal spinning, operating spinning, brazing, plating, soldering, polishing and lacquering rooms.

**A-G Manufacturing Company,** Los Angeles, Calif., has awarded a contract for construction of a new one-story plant, 90 x 135 ft., to cost about $40,000 with equipment. Company manufactures steel cabinets and electrical equipment, operating plants at Los Angeles and Seattle, Wash. The firm has metal working, plating, japanning, stamping, polishing, lacquering and tool departments.

**United Smelting and Aluminum Company, Inc.,** New Haven, Conn., manufacturers of aluminum sheets, coils, plates and circles, announce the appointment of **Frank W. Graves,** Suite 1928 Railway Exchange Building, St. Louis, Mo., as their representative in the State of Missouri. Mr. Graves is well known in the Middle West, having been connected with the iron and steel trade in that district for the past twenty-five years.

**National Chromium Corporation,** 200 Varick Street, New York City, has made changes in its plant involving an increase of 30,000 sq. ft. of floor space. Additional very large nickel and die cast nickel tanks, and acid copper as well as cyanide copper tanks have been installed. The company is also installing three additional large motor generators of extremely high amperage, and is increasing the capacity of its polishing department over 200 per cent.

---

# Metal Market Review

By R. J. HOUSTON,

D. Houston & Company, Metal Brokers, New York

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

MARCH 1, 1928.

## Copper

During February the leading producers have succeeded in keeping the market remarkably steady, although this period was comparatively dull. Buying for both domestic and export account did not measure up to the averages of a few months ago. Activity was by no means altogether quiescent, however, and some substantial sales were made to the home and foreign trade. The domestic market quotes 14c to 14⅛c, with the export price unchanged at 14½c. c. i. f. European ports. An easier tone prevailed at the close, with sellers as low as 13⅞c.

Large pending requirements are figured on for March and April. New inquiries for deliveries over the next 60 days are therefore due at any time, and a more normal demand should develop soon.

## Zinc

Zinc was under considerable selling pressure during February and prices reflected the depressing conditions which have prevailed for a long period. A new low price of 5.40c East St. Louis was made in the last half of the month, but later the market developed a little steadier tone at 5.47½ for Prime Western, with offerings more restricted. The New York basis is quotable at 5.82½c for shipments over the next 30 days. Ore prices in the Joplin market receded to $34 to $35, but producers were inclined to hold out for better prices. Consuming demand for nearby shipment has been moderate but there are substantial pending requirements which will have to be covered.

## Tin

A pronounced downward trend in the market for tin and general weakness of prices were outstanding features during February. The statistical position on February 1 showed a visible supply of 15,244 long tons as against 15,342 tons a year ago. Despite the fact that supplies on both these dates were so nearly the same, the price structure recently showed a difference of 12 to 13 cents per pound as compared with the market quotation for prompt Straits a year ago. Bearish sentiment has been actively and persistently in evidence, especially in London circles, for many weeks. This attitude has taken concrete form by means of aggressive speculative sales at the English center which forced prices down to 51c for Straits tin during the last half of February. The market level reached 71c in February, 1927. Prices were abnormally high then and even at current levels it is a ques-

tion of real interest to the consuming trade if the recent decline has not produced a healthier situation.

All positions were easier at the close of month, with spot and March Straits quoting 59⅞c to 15¾c, market easy. London was a heavy seller on the downward trend.

### Lead

There were four reductions in the price of pig lead during February. The New York basis is now 6c, the lowest since 1923. The weak, sagging condition of the market situation has been apparent for some time. Consuming demand was on a moderate scale, and thus far the new values have not played a prominent part in new business. Receding London quotations and an unsatisfactory foreign position have exerted a restrictive influence on buyers. Refined output and stocks on hand both show increases. Curtailment of production might tend to restore a sounder balance between supply and demand and create trade confidence in the situation. Producers, however, are aiming to find a trading basis that will give momentum to the buying movement. Undoubtedly activity will develop on a larger scale in due course as manufacturing requirements become more urgent as spring operations get into full swing.

### Aluminum

Demand for aluminum was fair recently, though sellers are anxious for greater activity and more urgent requirements. There has been no essential change in market conditions, and domestic prices remain at 24.30c for 99% plus and 22.30c for 94% plus ingots. Automobile requirements have come short of expectations but increased demand is looked for during the spring months. New and important uses for aluminum are being developed which should give the product a wider field for distribution.

### Quicksilver

The local and London markets for quicksilver have shown an easier tendency lately, and present quotations are $121 to $122 per flask. A moderate demand was reported but buyers were not inclined to operate very freely, owing to the downward trend of the market. Sellers, however, were more hopeful in view of stocks becoming smaller.

### Platinum

Refined platinum is quoted $80 to $81 per ounce. This compares with $87 a few weeks ago. Prices have been irregular lately.

### Antimony

There was a moderate business in antimony for domestic account but activity was intermittent in character, with prices easier at the end of the month. Latest quotations were 10½c. for futures, with some spot sales at same price. Early in the month Chinese regulus was quoted at 11½c. to 11⅜c. duty paid. Arrivals from Far East lately have been in good volume, but these appeared to be easily absorbed against former sales and a certain amount of new demand. Buyers were not specially eager to enter into fresh contracts even at the more attractive prices.

### Silver

There has been but a slight fundamental change in silver lately. Steadiness has been a feature without any unusual developments. China was a frequent buyer and at times operated as both buyer and seller. India displayed little interest and at no time last month took a very pronounced part in the market. Transactions for Chinese account furnished a substantial amount of business. Recent reports from Mexico reported possible exhaustion of existing sources of production in that country. Domestic price at end of month was quoted at 57¼c per ounce.

### Old Metals

Demand was in fair volume in the first half of February, but it scaled off at the latter end of the month. Copper scrap had a good outlet, but lead was especially weak. The quiet state of the markets for new metals had a reflex action on old material. Buyers require concessions and with a tendency towards lower levels the situation in various old metals is somewhat of a waiting one. No. 1 scrap copper quotes around 12⅝c. Prices dealers offer to pay are as follows: heavy copper, 11½c to 11¾c; light copper, 10c to 10¼c; heavy brass, 7¼c to 7½c; light brass, 5¾c to 6c; heavy lead, 5c to 5¼c; old zinc, 3¼c to 3½c; aluminum clippings, 17½c to 18c.

# Daily Metal Prices for the Month of February, 1928

## Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

| | FEBRUARY | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Copper** c/lb. Duty Free | 1 | 2 | 3 | 6 | 7 | 8 | 9 | 10 | *13 | 14 | 15 | 16 |
| Lake (Delivered) | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | 14.25 | .... | 14.25 | 14.25 | 14.25 |
| Electrolytic (f. a. s. N. Y.) | 14.35 | 14.30 | 14.30 | 14.30 | 14.30 | 14.30 | 14.30 | 14.30 | .... | 14.30 | 14.30 | 14.30 |
| Casting (f. o. b. Ref.) | 13.75 | 13.75 | 13.75 | 13.75 | 13.75 | 13.75 | 13.75 | 13.75 | .... | 13.75 | 13.75 | 13.75 |
| **Zinc** (f. o. b. St. L.) c/lb. Duty 1¼c/lb. | | | | | | | | | | | | |
| Prime Western | 5.65 | 5.625 | 5.65 | 5.65 | 5.65 | 5.625 | 5.625 | 5.625 | .... | 5.60 | 5.60 | 5.50 |
| Brass Special | 5.70 | 5.675 | 5.70 | 5.70 | 5.70 | 5.675 | 5.675 | 5.675 | .... | 5.65 | 5.65 | 5.60 |
| **Tin** (f. o. b. N. Y.) c/lb. Duty Free | | | | | | | | | | | | |
| Straits | 54.25 | 54.50 | 54.125 | 53.625 | 53.25 | 53.25 | 53.125 | 52.375 | .... | 52.00 | 51.375 | 51.75 |
| Pig 99% | 53.50 | 54.00 | 53.75 | 53.25 | 52.50 | 52.375 | 52.625 | 51.50 | .... | 51.375 | 50.75 | 50.75 |
| **Lead** (f. o. b. St. L.) c/lb. Duty 2⅝c/lb. | 6.25 | 6.20 | 6.25 | 6.25 | 6.25 | 6.225 | 6.225 | 6.15 | .... | 6.15 | 6.15 | 6.15 |
| **Aluminum** c/lb. Duty 5c/lb. | 24.30 | 24.30 | 24.30 | 24.30 | 24.30 | 24.30 | 24.30 | 24.30 | .... | 24.30 | 24.30 | 24.30 |
| **Nickel** c/lb. Duty 3c/lb. | | | | | | | | | | | | |
| Ingot | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | .... | 35 | 35 | 35 |
| Shot | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | .... | 36 | 36 | 36 |
| Electrolytic | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | .... | 37 | 37 | 37 |
| **Antimony** (J. & Ch) c/lb. Duty 2c/lb. | 11.375 | 11.25 | 11.125 | 11.00 | 11.00 | 10.875 | 10.75 | 10.875 | .... | 10.875 | 10.875 | 10.875 |
| **Silver** c/oz. Troy Duty Free | 56.625 | 56.75 | 56.625 | 56.50 | 56.75 | 56.75 | 57.00 | 57.125 | .... | 57.25 | 57.125 | 57.00 |
| **Platinum** $/oz. Troy Duty Free | 83 | 83 | 83 | 83 | 83 | 83 | 83 | 83 | .... | 81 | 81 | 81 |

| **Copper** c/lb. Duty Free | 17 | 20 | 21 | *22 | 23 | 24 | 27 | 28 | 29 | High | Low | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lake (Delivered) | 14.25 | 14.25 | 14.25 | .... | 14.20 | 14.20 | 14.20 | 14.20 | 14.20 | 14.25 | 14.20 | 14.237 |
| Electrolytic (f. a. s. N. Y.) | 14.30 | 14.30 | 14.30 | .... | 14.25 | 14.25 | 14.25 | 14.20 | 14.20 | 14.35 | 14.20 | 14.284 |
| Casting (f. o. b. Ref.) | 13.75 | 13.75 | 13.70 | .... | 13.70 | 13.70 | 13.70 | 13.65 | 13.65 | 13.75 | 13.65 | 13.729 |
| **Zinc** (f. o. b. St. L.) c/lb. Duty 1¼c/lb. | | | | | | | | | | | | |
| Prime Western | 5.525 | 5.50 | 5.45 | .... | 5.425 | 5.425 | 5.45 | 5.475 | 5.475 | 5.65 | 5.425 | 5.554 |
| Brass Special | 5.575 | 5.55 | 5.50 | .... | 5.475 | 5.475 | 5.50 | 5.525 | 5.525 | 5.70 | 5.475 | 5.607 |
| **Tin** (f. o. b. N. Y.) c/lb. Duty Free | | | | | | | | | | | | |
| Straits | 52.25 | 51.50 | 51.50 | .... | 51.375 | 51.875 | 52.375 | 51.75 | 51.125 | 54.50 | 51.125 | 52.493 |
| Pig 99% | 51.25 | 51.00 | 50.75 | .... | 50.625 | 51. | 51.625 | 51.375 | 50.75 | 54. | 50.625 | 51.829 |
| **Lead** (f. o. b. St. L.) c/lb. Duty 2⅝c/lb. | 6.125 | 6.00 | 6.00 | .... | 6.00 | 6.00 | 5.90 | 5.80 | 5.75 | 6.25 | 5.75 | 6.091 |
| **Aluminum** c/lb. Duty 5c/lb. | 24.30 | 24.30 | 24.30 | .... | 24.30 | 24.30 | 24.30 | 24.30 | 24.30 | 24.30 | 24.30 | 24.30 |
| **Nickel** c/lb. Duty 3c/lb. | | | | | | | | | | | | |
| Ingot | 35 | 35 | 35 | .... | 35 | 35 | 35 | 35 | 35 | 35 | 35 | |
| Shot | 36 | 36 | 36 | .... | 36 | 36 | 36 | 36 | 36 | 36 | 36 | |
| Electrolytic | 37 | 37 | 37 | .... | 37 | 37 | 37 | 37 | 37 | 37 | 37 | |
| **Antimony** (J. & Ch) c/lb. Duty 2c/lb. | 10.875 | 10.75 | 10.75 | .... | 10.75 | 10.50 | 10.50 | 10.50 | 10.25 | 11.375 | 10.25 | 10.829 |
| **Silver** c/oz. Troy Duty Free | 57.25 | 57.25 | 57.25 | .... | 57.375 | 57.25 | 57.25 | 57.25 | 57.25 | 57.375 | 56.50 | 57.033 |
| **Platinum** $/oz. Troy Duty Free | 81 | 81 | 81 | .... | 81 | 81 | 81 | 81 | 81 | 83 | 81 | 81.842 |

*Holiday.

# Metal Prices, March 5, 1928

## NEW METALS

**Copper:** Lake, 14.25. Electrolytic, 14.125. Casting, 13.80.
Zinc: Prime Western, 5.50. Brass Special, 5.55.
Tin: Straits, 52.125. Pig, 99%, 51.625.
Lead: 5.75. **Aluminum,** 24.30. **Antimony,** 10.25.
**Nickel:** Ingot, 35. Shot, 36. Elec. 37. Pellets, 40.
**Quicksilver:** flask, 75 lbs. $122. **Bismuth,** $2.10.
**Cadmium,** 75. **Cobalt,** 97%, $2.60. **Silver,** oz., Troy, 57.125.
**Gold:** oz., Troy, $20.67. **Platinum,** oz., Troy, $77-$78.

## INGOT METALS AND ALLOYS

| | |
|---|---|
| Brass Ingots, Yellow | 10 to11 |
| Brass Ingots Red | 12 to13½ |
| Bronze Ingots | 12½to16 |
| Casting Aluminum Alloys | 21 to24 |
| Manganese Bronze Castings | 23 to40 |
| Manganese Bronze Ingots | 12½to16½ |
| Manganese Bronze Forging | 32 to40 |
| Manganese Copper, 30% | 25 to35 |
| Monel Metal Shot | 28 |
| Monel Metal Blocks | 28 |
| Parsons Manganese Bronze Ingots | 16½to19¾ |
| Phosphor Bronze | 14 to15 |
| Phosphor Copper, guaranteed 15% | 18 to21 |
| Phosphor Copper, guaranteed 10% | 17 to20 |
| Phosphor Tin, guaranteed 5% | 75 to80 |
| Phosphor Tin, no guarantee | 60 to70 |
| Silicon Copper, 10%....according to quantity.... | 28 to32 |

## OLD METALS

| Buying Prices | | Selling Prices |
|---|---|---|
| 12¼to12¾ | Heavy Cut Copper | 13¾to14 |
| 12 to12½ | Copper Wire | 13 to13¼ |
| 10 to10½ | Light Copper | 11¾to12¼ |
| 10 to10¼ | Heavy Machine Composition | 11 to11½ |
| 7¾to 8 | Heavy Brass | 9¼to 9½ |
| 6½to 6¾ | Light Brass | 8 to 8¼ |
| 7¾to 8 | No. 1 Yellow Brass Turnings | 9¼to 9¾ |
| 9¼to 9½ | No. 1 Composition Turnings | 10¾to11 |
| 5½to 5¾ | Heavy Lead | 6¾to 7 |
| 3½to 3¾ | Zinc Scrap | 4¾to 5¼ |
| 8 to10 | Scrap Aluminum Turnings | 12½to14¼ |
| 13 to13½ | Scrap Aluminum, cast alloyed | 17½to18½ |
| 19 to20 | Scrap Aluminum, sheet (new) | 22 to22½ |
| 35 to37 | No. 1 Pewter | 41½to43½ |
| 11½ | Old Nickel Anodes | 13½ |
| 17½ | Old Nickel | 19½ |

# Wrought Metals and Alloys

## COPPER SHEET

Mill shipment (hot rolled) ..... 22¾c. to 23¾c. net base
From Stock ..... 23¾c. to 24¾c. net base

## BARE COPPER WIRE

15⅞c. to 16⅛c., net base, in carload lots.

## COPPER SEAMLESS TUBING

24½c. to 25½c. net base.

## SOLDERING COPPERS

300 lbs. and over in one order ..... 21¼c. net base
100 lbs. to 200 lbs. in one order ..... 21¾c. net base

## ZINC SHEET

Duty sheet, 15% Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount ..... 10.00 net base
Casks, jobbers' price ..... 10.50 net base
Open casks, jobbers' price ..... 10.75 to 11.25 net base

## ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price ..... 33½c.
Aluminum coals, 24 ga., base price ..... 31½c.

## ROLLED NICKEL SHEET AND ROD

Net Base Prices

| | | | |
|---|---|---|---|
| Cold Drawn Rods..... | 53c. | Cold Rolled Sheet..... | 60c. |
| Hot Rolled Rods..... | 45c. | Full Finished Sheet.... | 52c. |

## BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 10½c. over Pig Tin; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

## SILVER SHEET

Rolled sterling silver 58¼c. to 60¼c. per ounce, Troy.

## BRASS MATERIAL—MILL SHIPMENTS

In effect December 2, 1927
To customers who buy 5,000 lbs. or more in one order.

| | Net base per lb. | | |
|---|---|---|---|
| | High Brass | Low Brass | Bronze |
| Sheet | $0.18¾ | $0.20¼ | $0.22¼ |
| Wire | .19¼ | .20¾ | .22¾ |
| Rod | .16½ | .21 | .23 |
| Brazed tubing | .26¾ | .... | .32 |
| Open seam tubing | .26¾ | .... | .32 |
| Angles and channels | .29¾ | .... | .35 |

For less than 5,000 lbs. add 1c. per lb. to above prices.

## BRASS SEAMLESS TUBING

23⅝c. to 24⅝c. net base.

## TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod ..... 20¾c. net base
Muntz or Yellow Metal Sheathing (14"x48") 18¾c. net base
Muntz or Yellow Rectangular sheet other Sheathing ..... 19¾c. net base
Muntz or Yellow Metal Rod ..... 16¾c. net base
Above are for 100 lbs. or more in one order

## NICKEL SILVER (NICKELENE)

Net Base Prices

| Grade "A" Sheet Metal | | Wire and Rod | |
|---|---|---|---|
| 10% Quality ..... | 26½c. | 10% Quality ..... | 29½c. |
| 15% Quality ..... | 28 c. | 15% Quality ..... | 33¼c. |
| 18% Quality ..... | 29¼c. | 18% Quality ..... | 36½c. |

## MONEL METAL SHEET AND ROD

| | | | |
|---|---|---|---|
| Hot Rolled Rods (base) | 35 | Full Finished Sheets (base) | 42 |
| Cold Drawn Rods (base) | 43 | Cold Rolled Sheets (base) | 50 |

## BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin. price; 100 lbs. to 500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c. over; less than 25 lbs., 25c. over. Prices f. o. b. mill.

# Supply Prices, March 5, 1928

## ANODES

| | | | |
|---|---|---|---|
| **Copper:** Cast | 21 c. per lb. | **Nickel:** 90-92% | 45c. per lb. |
| Rolled | 19⅞c. per lb. | 95-97% | 47c. per lb. |
| Electrolytic | 18¼c. per lb. | 99% | 49c. per lb. |
| **Brass:** Cast | 20 c. per lb. | **Silver:** Rolled silver anodes .999 fine are quoted from 60¼c. to 62¼c., Troy ounce, depending upon quantity purchased. | |
| Rolled | 19⅞c. per lb. | | |
| **Zinc:** Cast | 12½c. per lb. | | |

## FELT POLISHING WHEELS WHITE SPANISH

| Diameter | Thickness | Under 100 lbs. | 100 to 200 lbs. | Over 200 lbs. |
|---|---|---|---|---|
| 10-12-14 & 16" | 1" to 3" | $3.00/lb. | $2.75/lb. | $2.65/lb. |
| 6-8 & over 16 | 1 to 3 | 3.10 | 2.85 | 2.75 |
| 6 to 24 | Under ½ | 4.25 | 4.00 | 3.90 |
| 6 to 24 | ½ to 1 | 4.00 | 3.75 | 3.65 |
| 6 to 24 | Over 3 | 3.40 | 3.15 | 3.05 |
| 4 up to 6 | ¼ to 3 | 4.85 | 4.85 | 4.85 |
| 4 up to 6 | Over 3 | 5.25 | 5.25 | 5.25 |
| Under 4 | ¼ to 3 | 5.45 | 5.45 | 5.45 |
| Under 4 | Over 3 | 5.85 | 5.85 | 5.85 |

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices.

## COTTON BUFFS

Full Disc Open buffs, per 100 sections.

| | |
|---|---|
| 12" 20 ply 64/68 Unbleached | $30.35 |
| 14" 20 ply 64/68 Unbleached | 39.05 |
| 12" 20 ply 80/92 Unbleached | 31.85 |
| 14" 20 ply 80/92 Unbleached | 43.20 |
| 12" 20 ply 84/92 Unbleached | 42.50 |
| 14" 20 ply 84/92 Unbleached | 57.60 |
| 12" 20 ply 80/84 Unbleached | 38.35 |
| 14" 20 ply 80/84 Unbleached | 52.00 |
| Sewed Pieced Buffs, per lb., bleached | .45-.70 |

## CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

| | | |
|---|---|---|
| Acetone | lb. | .11-.17 |
| Acid—Boric (Boracic) Crystals | lb. | .12 |
| Chromic, 75 and 125 lb. drums | lb. | .24-.25 |
| Hydrochloric (Muriatic) Tech., 20°, Carboys | lb. | .02 |
| Hydrochloric, C. P., 20 deg., carboys | lb. | .06 |
| Hydrofluoric, 30%, bbls | lb. | .08 |
| Nitric, 36 deg., carboys | lb. | .06 |
| Nitric, 42 deg., carboys | lb. | .07 |
| Sulphuric, 66 deg., carboys | lb. | .02 |
| Alcohol—Butyl | lb. | .17⅝-.22⅛ |
| Denatured, bbls | gal. | .59 |
| Alum—Lump, Barrels | lb. | .03¼ |
| Powdered, Barrels | lb. | .042 |
| Aluminum sulphate, commercial tech | lb. | .02⅜ |
| Aluminum chloride solution in carboys | lb. | .06½ |
| Ammonium—Sulphate, tech., bbls | lb. | .03¾ |
| Sulphocyanide | lb. | .65 |
| Arsenic, white, kegs | lb. | .05 |
| Asphaltum | lb. | .35 |
| Benzol, pure | gal. | .60 |
| Borax Crystals (Sodium Biborate), bbls | lb. | .04½ |
| Calcium Carbonate (Precipitated Chalk) | lb. | .04 |
| Carbon Bisulphide, Drums | lb. | .06 |
| Chrome Green, bbls. | lb. | .28 |
| Chromic Sulphate | lb. | .37 |
| Copper—Acetate (Verdigris) | lb. | .37 |
| Carbonate, bbls. | lb. | .16-.17 |
| Cyanide (100 lb. kegs) | lb. | .50 |
| Sulphate, bbls. | lb. | .05¾ |
| Cream of Tartar Crystals (Potassium Bitartrate) | lb. | .27 |
| Crocus | lb. | .15 |
| Dextrin | lb. | .05-.08 |
| Emery Flour | lb. | .06 |
| Flint, powdered | ton | $30.00 |
| Fluor-spar (Calcic fluoride) | ton | $75.00 |
| Fusel Oil | gal. | $4.45 |
| Gold Chloride | oz. | $14.00 |
| Gum—Sandarac | lb. | .26 |
| Shellac | lb. | .59-.61 |
| Iron Sulphate (Copperas), bbl. | lb. | .01½ |
| Lead Acetate (Sugar of Lead) | lb. | .13¾ |
| Yellow Oxide (Litharge) | lb. | .12½ |
| Mercury Bichloride (Corrosive Sublimate) | lb. | $1.58 |
| Nickel—Carbonate, dry, bbls. | lb. | .29 |
| Chloride, bbls. | lb. | .17-.18 |
| Salts, single, 300 lb. bbls. | lb. | .10½ |
| Salts, double, 425 lb. bbls. | lb. | .10 |
| Paraffin | lb. | .05-.06 |
| Phosphorus—Duty free, according to quantity | lb. | .35-.40 |
| Potash, Caustic Electrolytic 88-92% broken, drums | lb. | .09¾ |
| Potassium Bichromate, casks (crystals) | lb. | .08½ |
| Carbonate, 96-98% | lb. | .07-.07½ |
| Cyanide, 165 lb. cases, 94-96% | lb. | .57½ |
| Pumice, ground, bbls. | lb. | .02½ |
| Quartz, powdered | ton | $30.00 |
| Rosin, bbls. | lb. | .04½ |
| Rouge, nickel, 100 lb. lots | lb. | .25 |
| Silver and Gold | lb. | .65 |
| Sal Ammoniac (Ammonium Chloride) in casks | lb. | .05½ |
| Silver Chloride, dry, 100 oz. lots | oz. | .50½ |
| Cyanide (fluctuating) | oz. | 57½-.60 |
| Nitrate, 100 ounce lots | oz. | .41¼-.41½ |
| Soda Ash, 58%, bbls. | lb. | .02½ |
| Sodium—Cyanide, 96 to 98%, 100 lbs. | lb. | .19 |
| Hyposulphite, kegs | lb. | .04 |
| Nitrate, tech., bbls. | lb. | .04¾ |
| Phosphate, tech., bbls. | lb. | .03¾ |
| Silicate (Water Glass), bbls. | lb. | .02 |
| Sulpho Cyanide | lb. | .45 |
| Sulphur (Brimstone), bbls. | lb. | .02 |
| Tin Chloride, 100 lb. kegs | lb. | .39½ |
| Tripoli, Powdered | lb. | .03 |
| Wax—Bees, white, ref. bleached | lb. | .60 |
| Yellow, No. 1 | lb. | .45 |
| Whiting, Bolted | lb. | .02½-.06 |
| Zinc, Carbonate, bbls. | lb. | .11-.12 |
| Chloride, casks | lb. | .06 |
| Cyanide (100 lb. kegs) | lb. | .41 |
| Sulphate, bbls. | lb. | .03 |